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AN EXPLORATORY STUDY IN THE USE OF TEACHER RATINGS IN THE EARLY IDENTIFICATION OF CHILDREN WITH LEARNING DIFFICULTIES

by

© Thomas Joseph Boniferro

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The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies and Research, for acceptance, a thesis entitled "An Exploratory Study in the Use of Teacher Ratings in the Early Identification of Children with Learning Difficulties" submitted by Thomas Joseph Boniferro in partial fulfilment of the requirements for the degree of Doctor of Philosophy in Counselling and School Psychology.

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ABSTRACT

In recent years there has been an increased emphasis on the early identification of children with learning difficulties. This emphasis has resulted in a proliferation of studies in the medical, psychological and educational literature. A review of these studies has indicated a great diversity in the choice of variables used in these previous investigations along with a lack of rationale for the use of variables. For this reason, the present investigator has presented a model in which the major studies could be categorized and discussed. The integrated information processing model also provides a theoretical basis for the early identification field.

The traditional approaches to early detection have been criticized and recommendations for a new methodology have been presented. A major focus of these recommendations has been the use of teacher ratings in early identification studies. However, validity for the use of teacher ratings has not been well established. One of the major reasons for this lack of evidence is the inadequacy of existing rating scales.

The purpose of this investigation was to devise a rating scale and to demonstrate the predictive efficiency of grade one teacher's rating using this scale.

Myklebust's Pupil Rating Scale and Adelman and Feshbach's Student Rating Scales along with supplementary items derived by McCarthy served as the basis for the Grade One Rating Scale. These instruments were presented to eight grade one teachers and six

experts for examination. Unsatisfactory items were eliminated and the resultant scale, containing 60 items in the Myklebust format was distributed to 16 grade one teachers from the Edmonton Public School Board. The teachers completed ratings on each of the pupils resulting in a total of 354 pupils being rated.

A varimax orthogonal rotation was applied to the principal components factor analysis of the items from the scale. The obtained factor structure yielded 9 factors considered suitable for interpretation. Internal consistency estimates for each scale ranged from .235 to .646. A step-wise multiple regression analysis was carried out using the nine subtests of the Grade One Rating Scale as predictors and reading and arithmetic scores as criteria. Six subtests contributed to the regression equations for the various criteria. Multiple correlations ranged from .43 to .78 for boys, .63 to .81 for girls and from .55 to .80 for the combined sample. The cross-validation multiple correlation calculated for the cross-validation sample remained reasonably close to the multiple correlation corrected for shrinkage. The predictive efficiency of the six subtests was supported by sizeable correlations coefficients between teachers ranked groupings of their pupils and rating scores, as well as lower correlation coefficients between the Metropolitan Readiness Test and criterion measures. The multiple correlation coefficient did not increase appreciably when the Metropolitan Readiness Test was included in the regression as a predictor.

The significant multiple correlations demonstrated the predictive validity of teachers' ratings of their pupils on specific

behavioural dimensions. The findings strongly suggest that grade one teachers be used more actively and systematically in early identification studies.

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TABLE OF CONTENTS

CHAPTER PAGE

I. INTRODUCTION 1

II. REVIEW OF THE LITERATURE 4

Introduction 4

Information Processing: Conceptual Models 5

An Integrated Information Processing Model 10

Screening and Prediction Using Single Variables 20

Screening and Prediction Using a Combination of Variables 35

New Directions for Early Identification 47

Teacher Ratings in Early Identification 52

Teacher Rating Scales 55

Summary 60

The Problem 61

III METHOD 62

Subjects 62

Measuring Instruments.................................. 63

Procedure 66

Data Analysis 68

IV RESULTS 70

V DISCUSSION 98

Limitations 104

Delimitations 105

Significance and Implications 106

***

PAGE

REFERENCES 112

APPENDIX A. THE STUDENT RATING SCALE 128

APPENDIX B. THE PUPIL RATING SCALE......................... 135

APPENDIX C. SUPPLEMENTARY ITEMS 142

APPENDIX D. THE STUDENT RATING SCALE (RESULTANT SCALE) 146

APPENDIX E. THE GRADE ONE RATING SCALE (PRELIMINARY FORM) .. 157

APPENDIX F. THE GRADE ONE RATING SCALE (FINAL FORM) (NORMATIVE DATA AND DIRECTIONS FOR ADMINISTRATION AND SCORING)................................ 167

APPENDIX G. RESULTS OF PRINCIPAL COMPONENTS FACTOR ANALYSIS FOR COMBINED SAMPLE AND BOYS AND GIRLS SEPARATELY 176

VITA 180

LIST OF TABLES

Table	Description	Page
1.	Variances of the Latent Roots for Principal Component Analysis after Varimax Rotation	71
2.	Varimax Loadings on Nine Factors	72
3.	Internal Consistency Estimates for the Nine Subtests of the Grade One Rating Scale	79
4.	Summary of Step-Wise Regression Analysis of the Grade One Rating Scale as Predictor and Achievement Measures as Criterion for Combined Sample of Boys and Girls	81
5.	Summary of Step-Wise Regression Analysis of the Grade One Rating Scale as Predictor and Achievement Measures as Criterion for Boys	82
6.	Summary of Step-Wise Regression Analysis of the Grade One Rating Scale as Predictor and Achievement Measures as Criterion for Girls	84
7.	Multiple Correlations Between Subtests of Grade One Rating Scale and Achievement Measures	86
8.	Multiple Correlations Corrected for Shrinkage and Cross Validation Multiple Correlation for Cross-Validation Sample	89
9.	Pearson Product Moment Correlation Coefficients Between Teacher Ranked groups and Grade One Rating Scale Subtests	90
10.	Pearson Product Moment Correlation Coefficients Between Metropolitan Readiness Test Total Score and Criterion Measures	92
11.	Summary of Step-Wise Regression Analysis of the Grade One Rating Scale and Metropolitan Readiness Test as Predictors and Achievement Measures as Criterion for Combined Sample of Boys and Girls	94
12.	Multiple Correlations Between Grade One Rating Scale and Metropolitan Readiness Test as Predictors and Achievement Measures as Criterion	96

LIST OF FIGURES

Figure | Page

1. An integrated information processing model 11

CHAPTER I

Introduction

In recent years there has been an increasing interest in the prevention and remediation of school learning difficulties. (Roberts and Lazure, 1970). Today, greater emphasis is being placed on identifying, as early as possible, those children who need additional educational planning and resources in order to learn successfully. This emphasis on early identification of children with learning difficulties is reflected in an increased number of studies in the medical, psychological, and educational literature.

Previous attempts at early detection have consisted of empirical studies which have investigated numerous factors thought to be predictive of school success or failure. These factors which have been measured through the use of traditional psychometric instruments consist of a single area of the child's functioning, such as physical motor or language ability, as well as a varied combination of these abilities (de Hirsch and Jansky, 1972).

These traditional approaches to early identification have recently been criticized for their numerous limitations and shortcomings. More specifically, questions regarding the use of traditional psychometric data, as well as the relevance of this type of data in the development of appropriate preventive and remedial strategies, have been raised (Keogh and Becker, 1974). These issues have resulted in new approaches to early identification. A major focus which recent investigations have emphasized is the use of teacher ratings in early identification studies (Keogh, Tchir, & Windeguth, 1972).

However, validity for the use of teacher ratings in the identification of children with learning difficulties has not been well established. Research has shown that teachers are indeed effective in discriminating between low and high risk children. It has also been demonstrated that teachers are good judges of their pupils' readiness status. Nevertheless, little evidence exists for the predictive validity of teacher ratings of their pupils on specific behavioural dimensions considered relevant for adequate performance in school tasks. One of the major reasons for this lack of evidence is the inadequacy of existing rating scales.

The purpose of the present study was twofold. First, an attempt was made to devise a rating scale measuring those aspects of a pupil's behaviour considered predictive of school achievement. Secondly, it was the investigator's purpose to demonstrate the predictive efficiency of grade one teacher's ratings using this scale.

The chapters to follow contain a review of the related literature, the methodology and results of the present study, and a discussion of the findings. In reviewing the various studies in early identification, the investigator found great diversity in the choice of variables used in previous investigations. In addition, it was observed that a rationale for the use of the numerous variables was lacking. Therefore, as an attempt to introduce some order and rationale to the long list of studies in early detection, the present investigator decided to present a model in which the major studies could be grouped and discussed. The integrated information processing model presented in Chapter II is also an attempt to provide some theoretical basis for an area which has been considered solely as empirical in the past. It is hoped that this model will offer some direction to future investigators in the early identification area.

An information processing model can be best defined as a conceptual framework with which to describe handicapping conditions in children. Information models differ from other models such as that presented by the psycholinguistic model of the Illinois Test of Psycholinguistic Ability (ITPA). The major difference lies in their comprehensiveness and in their inclusion of components derived from a number rather than only a single conceptualization of learning problems.

As an initial attempt to use this model to describe behavioural dimensions associated with learning difficulties in children, the present investigator decided to discuss the subtests of the Grade One Rating Scale in the information processing terminlogy. However, it should be pointed out that the model was not used to construct the Grade One Rating Scale.

CHAPTER II

REVIEW OF THE LITERATURE

The early identification of children with learning difficulties has been the objective of a variety of disciplines, i.e. medicine, psychology and education. As a result, hundreds of seemingly unrelated studies appear in the body of the literature. These studies which have been mainly psychometric in nature, range from the study of a single area of the child's functioning to the construction of predictive test batteries which measure varied combinations of these areas.

A review of the major studies has made it quite clear that the results derived from these investigations have not provided sufficient guidance to all professionals in establishing early identification and educational treatment programmes. The inadequacy of present studies is largely due to the lack of unity and direction which has characterized these early detection studies. This lack of direction stems largely from the lack of a unifying model which can describe learning difficulties in children. Individual investigators have proposed their own test batteries and considered them major contributions to the existing body of diagnostic instruments. Only recently have these same investigators begun to realize that a comprehensive schema or model for describing learning difficulties in children is needed. One of the recent trends to emerge as a result of this realization is an emphasis on information processing models as a possible method to describe learning difficulties in an educationally meaningful way (Bradley and Gallagher, 1972).

The review of the literature in this chapter consists of six parts. In the first section, various information processing models which serve as the basis of an integrated model are presented. The second part contains a description of the integrated information processing model in which the major empirical studies in the area of early identification can be grouped. The third and fourth sections of the chapter deal with a discussion of single and multi-variable studies in terms of the information processing model. In the fifth part of this chapter, criticisms of the traditional psychometric techniques are presented along with a discussion of the proposed new directions for early identification studies. One of the major components of the new proposals is the use of teacher ratings as a predictive instrument. This is the focus of the present study and will be discussed in the last part of the chapter.

Information Processing: Conceptual Models

The value of analyzing human functions in terms of the flow of information within the organism has been well supported by theory in the past (Broadbent, 1958; 1971). Over the years various theoretical and mechanical models have been proposed as aids in understanding how information is processed within the human organism (Broadbent, 1958; Das, Kirby and Jarman, 1974; Farnham-Diggory, 1972). Only recently have information processing models been used in describing learning difficulties in children (Denhoff, Hainsworth and Hainsworth, 1971; Gallagher and Bradley, 1972, Sabatino, 1968).

The model presented below which will be used to discuss the major empirical studies in early identification contains elements derived from the models formulated by Sabatino (1968), Denhoff et al (1971) and Bradley and Gallagher (1972). For this reason, these specific models will be discussed in further detail.

Sabatino (1968) was one of the first investigators in the area of learning disabilities to use an information processing model to clarify the behaviour patterns involved in learning disabilities. His investigations have resulted in a parsimonious information processing model that describes the means by which children with learning disabilities process environmental information.

The model proposed by Sabatino contains three major components: 1) sensation, 2) perception and 3) cognition. Information is received in the sensory receptors where environmental stimulation and sensation occurs. This information which may be visual, auditory or haptic in nature is coded neurally and transmitted to the perceptual centres. Here, the information is interpreted into correct categories for further relay to the centres of higher learning. Cognitive processes operate in these higher centres to produce symbolic units in a systematic manner.

The model also includes two other important dimensions. The first dimension is the integration of perceptual information from more than one perceptual source (auditory, visual or haptic) and its storage (memory). The second dimension is an arousal mechanism which allows for the inter-connection between a meaningful perceptual experience and the transmission of that perceptual information appropriate to the conceptual units within the cortex.

In the area of early identification, Denhoff, Hainsworth and Hainsworth (1971) were the first investigators to consider an information processing model as a method for describing learning difficulties in children. These writers attempted to broaden the range of young children being considered at risk for potential learning difficulties by clearly defining the behavioural and skill patterns to be included in early identification. These writers believe that inefficiencies or inequities in information-processing skills provide the key for defining a group from which a significant number of children with learning problems will emerge. According to these authors children with learning difficulties show significant discrepancies between abstract reasoning skills and their ability to process information. In addition, they display significant discrepancies within or between the basic information-processing modalities and/or in behavioural control skills. Children with these kinds of discrepancies in information processing skills are at risk for learning whether this be the reading, spelling, and arithmetic of the elementary school years or the concepts and readiness skills of the preschool years.

In terms of the actual model, Denhoff, et. al. (1971) view information as flowing through the five processes of orientation, intake, integration, output and feedback. This flow may occur within or between the three major modalities through which children are educated; the visual-perceptual motor, the language, and body awareness and control (kinesthetic-gross motor). Characteristically, children with learning difficulties break down in one or more of these five processes within or across one or more of the three modalities. These children may also break down in behavioural organization so that they do not orient, integrate or feedback properly during the learning process (Hainsworth and Siqueland, 1969).

Bradley and Gallagher (1972) also present an information processing model which was designed to describe learning difficulties in children for early identification purposes. These investigators maintain that the total functioning of the individual can be divided into the major areas of 1) sensory reception, 2) perceptual organization, 3) cognitive processes, 4) expression and 5) control and regulating mechanisms. The individual may receive visual, auditory and haptic stimuli at the first s[illegible] of the information processing model. Then he will process this information at the central processing stage by using his past experience with the same stimuli or associations with similar stimuli. He can also evaluate the various characteristics of the stimuli at this stage. All of these central processing operations will determine the particular outcome by which the individual will express himself in speech, or by motor response. The feedback from the individual's response will then come back to him via the reaction of the stimuli to his own reaction. An additional component of the model, the control mechanism, regulates in part, such feedback information as the individual's own performance and determines the set or orientation of the individual. It determines how or whether the individual can focus attention on specific stimuli, or how the world is organized perceptually by the individual. It also determines the kinds of problem-solving strategies the child will apply to use past associations, given a particular problem, or the manner in which he will express the results of his search and operation.

The model presented by Gallagher and Bradley (1972) indicates that disruptions in functioning can occur at any point in this flow of information within the individual. Moreover, certain disruptions and deficiencies are more serious in influencing the individual's information-processing than others. For example, a single expressive handicap in the speech or motor area which does not involve other handicapping conditions would have relatively little effect on the total functioning of the individual, since perceptual organization and central processing remain relatively intact. Even the feedback mechanism would not be disastrously interfered with, since there are alternate routes by which his expressive behaviour can be sent back to the child. On the other hand, disruptions in the central processing or receptive functions will have a greater effect on the functioning of the child.

The three models discussed above, when used alone, do not appear to be adequate in discussing the numerous studies in the early identification area. It seems that an integrated model is necessary for this purpose. In the following section, an attempt is made to describe such a model.

An Integrated Information Processing Model

The information processing model shown in Figure I represents a functional model in which the major empirical studies in early identification can be grouped. The model contains elements from the three models presented above in addition to several new components. The major additions are the central processing functions of Chalfant and Scheffelin (1969) and short/long term store of Broadbent (1971).

The integrated model itself consists of three basic processes: input, central processing and output. The peripheral receptors or input channels, through which information is received, consist of vision, audition and kinesthetic-haptic. The central processing component includes visual, auditory and haptic processing (Chalfant and Scheffelin, 1969), cognitive processes and both short and long term memory (Broadbent, 1971). The output process includes speech, motor and writing functions. A control and regulating mechanism similar in function to the component presented by Bradley and Gallagher is also included in this integrated model. Integration, orientation and feedback are specific functions of this regulating mechanism.

The input process constitutes the first stage of information processing and remains identical to the reception function à la Bradley and Gallagher (1972). Information from the environment can be obtained by the human body through the different senses of hearing, sight, taste, smell, touch and body movement. While the average person uses all sensory avenues, the auditory and visual systems seem to be the major input systems for acquiring information. According to Chalfant and Scheffelin a great deal of research pertains to the auditory and visual input channels while there is comparatively little information concerning

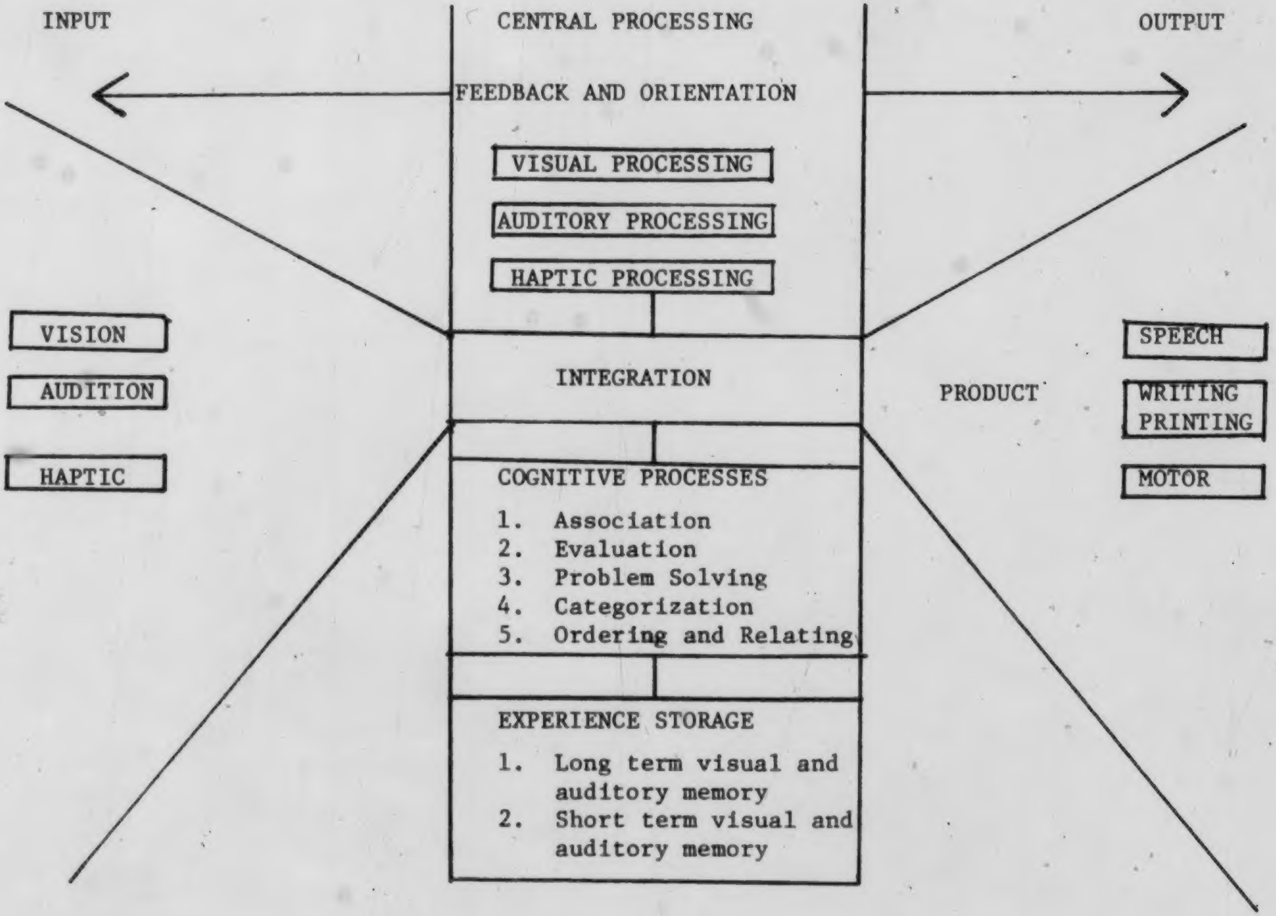
INPUT
CENTRAL PROCESSING
OUTPUT
FEEDBACK AND ORIENTATION
VISUAL PROCESSING
AUDITORY PROCESSING
HAPTIC PROCESSING
VISION
AUDITION
HAPTIC
INTEGRATION
PRODUCT
SPEECH
WRITING
PRINTING
MOTOR
COGNITIVE PROCESSES
1. Association
2. Evaluation
3. Problem Solving
4. Categorization
5. Ordering and Relating
EXPERIENCE STORAGE
1. Long term visual and auditory memory
2. Short term visual and auditory memory

Figure 1. An integrated information processing model

the third channel, the kinesthetic or haptic. They feel that haptic learning is extremely valuable because experience in touching deaf, blind, and deaf-blind children has clearly demonstrated the usefulness of using touch and body movement as a means of conveying information to children. Thus information is received through three major channels -- visual, auditory, and haptic.

Central processing functions constitute the second major part of the information processing model. Several of these components do not appear in the conceptual models presented above and have been added in order to further clarify the central processing functions. The various components which have been added include visual, auditory and haptic processing as well as short and long term storage.

Chalfant and Scheffelin (1969), in studying central processing dysfunctions in children, have identified three major types of sensory processing: auditory, visual and haptic. Auditory processing is defined as auditory perception and includes seven major tasks: 1) attention to auditory stimuli, 2) discrimination of sound versus no sound, 3) sound localization, 4) discriminating sounds varying on one acoustic dimension, 5) discriminating sound sequences varying on several acoustic dimensions, 6) auditory figure-ground selection and 7) associating sounds with sound sources.

Visual processing is defined as the integration and interpretation of visual stimuli and has been referred to as visual perception. The tasks involved in visual processing include 1) ocular-motor tasks, 2) spatial relationships, 3) visual discrimination and 4) object recognition.

Haptic processing refers to the integration of cutaneous and kinesthetic information. The haptic system is important for obtaining information about object qualities, bodily movement, and their interrelationships. This system provides two major kinds of information. The first category includes information about the environment such as: a) geometric information concerning surface area or size, shapes, lines and angles, b) surface texture, c) qualities of consistency such as hard, soft, resilient or viscous, d) pain, e) temperature and f) pressure. The second category, bodily movement, provides information about the body itself such as: a) dynamic movement patterns of the trunk arms, legs, b) static limb positions or postures, c) sensitivity to the direction of linear and rotary movement of the skull, limbs and entire body. Body movement also provides information about the location of objects in relation to the body itself.

The second major component in central processing consists of cognitive processes. In their review of the literature, Chalfant and Scheffelin (1969) found a variety of cognitive tasks involved in central processing in the three major sense modalities. They recognized that these cognitive tasks are all interrelated and difficult to separate from the actual processing functions discussed above. In fact, as an example, in visual processing they consider spatial orientation, body orientation and visual discrimination as cognitive tasks. These functions appear to be analogous to Bradley and Gallagher's associative and evaluative functions. The child when confronted with a stimulus evaluates it both in terms of his association with similar stimuli and in terms of the characteristics of the present stimuli.

In addition to the associative and evaluative kinds of cognitive tasks, other intellectual functions have been delineated as part of an information processing system. Other researchers (Farnham-Diggory, 1972) have delineated problem solving, categorizing or classifying information and the ordering and relating information as important cognitive functions.

Problem-solving as perceived by Farnham-Diggory is a general process which includes the major cognitive functions which will be discussed below. Problem-solving can be best considered as a systematic method by which the individual attacks a specific goal. Once a goal has been selected, a series of actions, subgoals, tests and retests are initiated to achieve it. Categorizing or classifying information is the heart of cognition. Bruner (1956) maintains that virtually all cognitive activity involves and is dependent on the process of categorizing. All of the child's interaction with the environment consists of dealing with classes of events. The child therefore needs to build up a system of "categories" or concepts which help him to handle the multitude of stimuli which are constantly impinging on him. Classification is therefore useful in that it permits the individual to decrease the complexity of the environment and thereby to identify new events easily and efficiently. The tasks of ordering and relating information are the last major cognitive functions in central processing. These functions allow an "executive planner" which can make decisions about how to relate one bit of information to another and how to handle interruptions of various kinds. Ordering and relating functions make use of types of relations that human beings seem to be naturally capable of recognizing - similarities, causes and time relations.

Experience storage constitutes the last major component of the central processing functions. This aspect of central processing is included in all of the major information processing models. However rarely do these models differentiate between short and long term storage. Broadbent (1957, 1971) was one of the first theorists to emphasize this differentiation. According to his flow of information model, after the incoming information is received by the senses it is held in a temporary (short term) store at a stage previous to that of a selective operation. After passage through the perceptual system, information may be returned to the same temporary store, the selection of information for such return being determined by information in a more permanent store. Broadbent therefore postulates the existence of two kinds of memory - both short and long term. Sabatino (1968) indicates a farther differentiation, that of auditory and visual memory. Therefore the integrated model includes auditory/visual short and long term memory.

The third major part of the integrated information processing model is output, Through the use of the output channel, the child is able to convey to others the information which he has received in a meaningful way. The child conveys or expresses this information in three major forms: 1) speech and language, 2) motor and 3) writing.

Speech and language expression refers to the ability of the individual to use spoken language as a means of communication. Research has shown that there are children who have no difficulty understanding what is said to them, but who are unable to use spoken language as a means of communication. Johnson and Myklebust (1967) have identified three kinds of disorders which seem to be most prevalent. First, children may have problems in remembering or retrieving words for spontaneous usage; secondly, the child may be unable to execute the motor patterns for speaking, and thirdly, the child may have difficulty in acquiring syntax.

Motor expression can be defined as the ability of the individual to convey the sensory information, which he has received and processed, in motoric form. Disturbances in motor expression, sometimes referred to as nonverbal apraxias (Johnson and Myklebust, 1967) are frustrating to children. Children with this disorder are usually inferior on the playground, in creative activities, in getting from one place to another and in completing a task. These children have not learned or developed the necessary motor patterns necessary to express their ideas and thoughts.

The third expressive process, that of writing, appears to be a more specific case of motor expression. Writing can be defined as the ability of the individual to make the appropriate motor movements for producing the graphic symbols. Disorders in writing have been described in different ways. Orton (1937) uses the label, developmental agraphia, in referring to the child's inability to form legible letters while Myklebust (1965) has used the term dysgraphia in describing a partial inability to write because of a dysfunction in the brain. Whatever the label or definition the end result in any writing disorder is an impairment in the writing process as a means of self expression. The implications of this kind of disability in school age children is obvious.

Thus, in this integrated information processing model, the sensory information can be expressed through language, motoric responses and writing. Disorders or disruptions can be manifested in each or all of these three modes of expression. However, a single expressive handicap in either of the speech, motor, or writing areas which does not involve other disruptions would not have a drastic effect on the total functioning of the individual. It would appear that remediation of expressive functions would be much more successful than amelioration of central processing difficulties.

Another important component of the information processing model is the control and regulating mechanism. This mechanism consists of three specific functions i.e. orientation, integration and feedback. The regulating mechanism does not appear as a separate entity in the integrated information model as it does in the models proposed by Bradley and Gallagher (1972) and Denhoff et. al. (1971). Instead this control mechanism can be best viewed as influencing all three of the input, processing and output components in information processing. This mechanism determines the orientation of the individual, regulates feedback information, and helps to integrate the various components in the central processing part of the information processing model. The control and regulating mechanism is not as easily measurable as other components such as memory or perception processes. However, there are certain behaviours which can be attributed to the control mechanism. Hyperactivity is perhaps the best example to be offered as evidence for a disruption in the central mechanism. Keogh (1975) has offered two hypotheses to explain the learning problems of hyperactive children, which are also helpful in describing hyperactivity as a disruption in the control mechanism.

Keogh's first hypothesis suggests that the nature and extent of the hyperactive child's motor activity disrupts the accurate acquisition of information. Motor activity is seen as interfering with attention to tasks and failure to learn is considered as a function of disruptive activity in the information acquisition stages of problem solving. In terms of the control mechanism, this inability to attend and receive information reflects a disruption in the orientation function of the regulating mechanism.

The second hypothesis proposed by Keogh is that hyperactive children have disturbed and speeded up decision making processes. Hyperactive children simply make decisions too rapidly and this results in poor problem solving. According to Keogh, hyperactive children might be considered extreme examples of the impulsive children described by Kagan (1965). Kagan states that hyperactive children are considered to lack thoughtfulness, to respond too quickly, to lack ability to think things through and to be unable to delay response. In terms of the functions of the control mechanism, this speeded up decision-making and thinking in hyperactive children can be best considered as a disruption in the integrative role of the mechanism. In the hyperactive child, the cognitive processes are not fully integrated with the other components in the information model. It can be concluded that this control and regulating mechanism plays an important role in information processing.

In summary, the integrated model presented in Figure I consists of four major parts. Information is processed in a circular fashion through the input, central processing and output channels. The information which is expressed through the output channel is then fed back by the feedback mechanism to the input channel. In this way, information which has already been processed influences the processing of new information. In addition to this feedback function, other aspects of the control and regulating mechanism provide for the free flow of information. The mechanism's orientation role ensures proper attention to appropriate stimuli while its integrative function provides the coordination of the various central processing functions. Disruptions may occur at any stage of information processing resulting in various kinds of learning difficulties in young children.

In this section, an attempt has been made to present a functional information processing model by which handicapping conditions in children can be better described. The model is by no means exhaustive since the functioning of the human organism consists of many more components than presented in Figure I. However, this model is presented as one way in which existing empirical studies in the early identification literature can be discussed and categorized. The following two sections therefore will attempt to discuss the various studies in terms of the functional model presented in Figure I.

Screening and Prediction Using Single Variables

Previous attempts at the early identification of children with learning difficulties have consisted of a proliferation of empirical studies conducted by the major disciplines (medicine, education and psychology) involved in early detection work. These studies have investigated a plethora of factors thought to be predictive of school success or failure. The specific factors studied have consisted of a single area of the child's functioning such as physical motor or language ability, as well as a varied combination of these abilities. Further investigations into the predictive value of a combination of factors have resulted in the construction of various predictive or screening batteries which can be used with large groups of children.

In this section, single variable studies will be dealt with. In the following section the studies pertinent to screening and prediction using a combination of variables will be discussed.

The majority of single factor studies have dealt with six critical areas of the child's personal functioning 1) sensory reception - audition and vision 2) physical-motor 3) perceptual 4) cognitive development 5) language development and 6) emotional - social development.

Sensory Reception

In regard to the area of sensory reception, it is not difficult to understand the emphasis on the early detection of hearing and vision problems in young children. In the information processing model, hearing and vision are categorized in the input process; therefore, defects in the auditory and visual input channel influence practically every other component in the information processing system.

In the field of early detection of serious hearing deficiencies in children, four clearly identifiable methods have been developed. These include play audiometry, involuntary response to sound, electrodermal audiometry and evoked response audiometry. However, these techniques have been employed in numerous studies (Price and Goldstein, 1966; Price, 1969; Downs and Sterrit, 1967; Lloyd, Spradlin and Reid, 1968; Kendall, 1966) without definitive results. Bradley and Gallagher (1972) suggest that the large number of false positives identified by these studies as well as confusion of a hearing deficit with other disorders are two probable reasons for deficiencies in these studies. Differential diagnoses using diagnostic teaching as a major method have been offered as alternatives to these four methods of "identification audiometry" (Meyers and Hammill, 1969).

The literature on early identification of vision problems, in distinct contrast to the hearing field, has been quite dormant in the past half decade (Bradley and Gallagher, 1972). These authors maintain that there are good reasons for vision screening at the preschool level and various screening batteries have been developed (Savitz, Reed, and Valadian, 1962). However, according to these authors the techniques do not presently seem equal to the task of identifying children with definite vision problems.

Physical Motor Development

The second area of the child's functioning which has been studied in early detection studies is physical motor development. More specifically, delayed motor development, clumsiness and hyperactivity have been considered as early indicators of potential learning problems.

Delayed motor development which can best be categorized as the motor expressive component in the information processing schema, has been considered as significant in the identification of the child with learning difficulties (Barsch and Rudell, 1962; Bryant, 1964; Karlin, 1957). Clumsiness which can also be considered as a deficit in the motor expressive component has also been shown to be a correlate of learning disorders (Paine, 1969; Twitchell, et. al., 1966). Hyperactivity, which is classified as a minor motor deviation, is considered the single most important motor characteristic to be used as a clue for learning problems (Knobel, Wolman and Mason, 1959; Laufer and Denhoff, 1957; Werry, 1969). There is some agreement that specific motor activities and specialized control movements are important, as the child learns by actively moving and exploring (Cratty, 1967; Dunsing and Kephart, 1965; Kephart, 1960). Hyperactivity can be best considered as a breakdown in this behavioural control mechanism. It already has been pointed out that hyperactivity can be viewed as a behavioural manifestation of a disruption in the control and regulating mechanism of the information processing model.

The conclusions regarding physical motor factors as predictors of subsequent school performance are equivocal and diverse. Bradley and Gallagher (1972), for example, have considered physical motor factors as severely limited and deserving of very little additional study in early identification studies. On the other hand, other investigators call for more detailed investigations. Leydorf (1969) urges that the relationships between motor ability and reading, writing and arithmetic be more carefully studied. Other questions which must be answered include: 1) the issue of whether maturation or early training and experience determine growth patterns and 2) which motor skills are developmental and which are learned. The general overall conclusion reached by the researchers in this area seems to be that although motor and physical development may contribute to the identification of the child with learning difficulties, they cannot stand alone, and must be evaluated in light of emotional and other parameters of the child's development.

Perceptual Development

A third area of psychological functioning which has been used in early identification studies is perceptual development. There is considerable evidence suggesting that adequate perceptual development is important for acquisition of beginning skills, especially in the area of reading. The specific areas of perceptual functions studied include visual and auditory perception, body image, and visuomotor integration.

The term, visual perception, as used in early detection studies, is comparable to the visual processing function within the central processing component of the information model. The predictive potential of visual perceptual competencies has been explored by way of both nonverbal and verbal visual tasks and by a combination of the two. Goins (1958) investigated kindergarten children's performance on fourteen nonverbal visual tests, using pictures and designs. Seven of them correlated significantly with first grade reading scores obtained eight months later. Gibson (1962) used solely verbal perceptual stimuli, letters and words, for purposes of prediction. Barrett (1965) investigated a combination of nonverbal and verbal visual stimuli, letters and words, for predicting reading achievement. He concluded that the two verbal visual tests, naming of letters and numbers, were the best single predictors. The general consensus reached regarding the use of visual perception as a predictor of school performance is that, in the final analysis, visual perception itself does not contribute enough to bear the entire burden of prediction. Visual perception plays a large part during the early stages of learning, but becomes far less important at higher grades when cognitive and linguistic competencies move more and more into the foreground.

Auditory perception is a second area of perceptual functioning which has been studied in early detection studies. This specific area is similar to the auditory processing function of the central processing component in the functional information processing model presented above. Both auditory discrimination and sound blending have been considered in terms of prediction. Dykstra (1966) administered seven measures of auditory discrimination to 632 children and found correlations ranging from .30 to .40 with reading scores. Chall, Roswell, and Blumenthal (1963) found a substantial relationship between auditory blending in Grade I and reading competence in Grade III. Beyond the study of these two dimensions, there are other subtle, but important aspects of auditory behaviour which have been neglected in terms of prediction. In order to improve prediction using auditory perception several researchers (de Hirsch and Jansky, 1972) deem it essential to investigate the complex interrelationships among the several aspects of auditory perception and other factors such as, intelligence and socioeconomic status.

Body image and visuomotor integration constitute the last of the perceptual factors to be considered in early identification studies. These areas can be classified mainly as haptic processing in terms of the information processing schema and deal with the child's ability to cope with spatial relationships. The major psychometric instrument used to measure this spatial ability has been children's human figure drawings. The rationale offered for the widespread use of the Human Figure Drawing is that the ability to cope with spatial relationships originally derives from the child's awareness of his own body, its parts, and the relationships of these parts to one another. Researchers have found significant correlations between the Draw-A-Man Test and subsequent achievement (Coleman, Iscoe and Brodsky, 1959; Shipps and Laudon, 1964; de Hirsch and Jansky, 1966).

The Bender Motor Gestalt Test, another instrument for evaluating visuomotor integration and spatial organization has been used successfully for prediction. Koppitz (1961) found a correlation of .68 between the Bender and the Metropolitan Achievement Test. De Hirsch and Jansky (1966) found that the Bender Gestalt proved to be one of the best predictors for reading performance thirty months later. Recent studies (Keogh and Smith, 1970; Lessler, Schoeninger and Bridges, 1970) have also demonstrated the use of the Bender Gestalt as a useful measure for the initial screening of children entering formal school programs.

There are differing opinions regarding the usefulness of perceptual measures in predictive studies. The proponents of the use of perceptual measures in predictive strategies conclude that perceptual variables seem to identify children who have a high probability of developing learning difficulties. One of these major proponents (Buktenica, 1971) favours the use of perceptual measures because they can be economically and reliably administered. Buktenica (1971) states that as group screening decisively proves to have more general use in assessing perceptual abilities of the population at large, it should prove to be an economical method of making instructional plans for large numbers of children, plans that now are feasible only on an individual basis for those children who receive a clinical work-up. However, critics of the use of perceptual measures as early predictors, state that these studies are of limited value in prediction (Wedell, 1970). The primary reason given is that knowledge of the minimal levels of perceptual skills necessary for achievement in the different types of basic educational tasks, is itself limited. These writers conclude that perceptual skills influence educational competence in indirect ways.

Cognitive Development

The fourth area of the child's functioning which has been studied in early detection studies is cognitive ability. Even though this ability is similar to the various cognitive processes outlined in the information processing model in Section I, researchers in early identification have not clearly defined nor specified the various cognitive abilities studied. Instead, these investigators have simply defined cognitive ability in a global fashion and have used the traditional intelligence measures in their studies. Rogolsky (1969) has recommended the use of the Harris-Goodenough Draw A Person Test as a screening measure at the kindergarten level. Silverstein (1968) has devised a short version of the Wechsler Primary and Preschool Scale of Intelligence (WPPSI) to be used in an early identification programme. Hagen, Silver and Corwin (1971), also using the WPPSI, found that the qualitative and quantitative material elicited by the test was useful in the selection of high risk children as well as in planning appropriate strategies of intervention. High risk children in this study achieved significant lower scores on the three I.Q. measures and subtest scores. In addition, the WPPSI profiles of these children were used to place the students in three distinct diagnostic groups. These groups were labelled as the specific language disability, organics, and developmental immaturity subgroups.

Even though early assessment of global intellectual capacity appeared at one time to be a justifiable goal of screening programmes, this is not the case any longer. Several reasons are offered for this. First of all, it has been shown that not all children with average or high IQ's learn to read. Furthermore, a few children with below average IQ's are in the top per cent of their classes as early readers (Durkin, 1966). Secondly, intelligence and learning achievement are not perfectly related because, by definition, some learning problems involve a discrepancy between predicted achievement based on the child's IQ score and his achievement in school as measured by achievement tests. Thus, at present, the IQ is no longer considered a significant predictor of school achievement.

Language Development

A fifth area in which predictive studies have been carried out is the child's language development. The studies in this area have been mainly of two types. One kind consists of the tracing of school histories of children and the others are longitudinal empirical studies. By tracing the school histories of high students, Fitzsimmons (1969) found that poorly performing students and dropouts had already experienced their first failure in the elementary grades. General communication skills were implicated as one factor responsible for these failures. The Palo Alto study of Educationally Handicapped Children (Stolz, 1969) studied the case histories of several groups of children with learning disorders. The findings revealed that these groups had a developmental history of communication problems of the articulative-expressive type. The language factors studied by the use of school histories are mainly of the expressive type and can be categorized quite readily into the speech component of the expressive process of the information processing model.

On the other hand, the longitudinal studies which have used language development as a predictor have studied both recpetive and expressive language functions. Two interesting studies deal with the predictive potential of oral language recpetion. Moe (1957) reported that a single measure of "auding" ability derived from the children's interpretations of stories predicted reading performance just as well as the readiness tests used in the study. Lauderville (1958) found that a test of listening skills was as effective a predictor of later reading competence as were the standardized readiness tests. It appears that the skills measured in the receptive language area are similar to those found in the auditory processing component of the information processing model presented earlier. The receptive language skills are auditory in nature and require specific subfunctions such as attention to the auditory stimuli as well as additional abilities such as, making inferences, resolving main ideas and following directions. The latter skills can be best considered as cognitive in nature, and can be labelled as associative and evaluative functions as outlined in the information-processing model.

In the expressive language area which is similar to the expressive process of speech in the information processing model, numerous investigators have found significant correlations between language factors andachievement results. Martin (1965) found an association between quantitative aspects of oral language (number of words, number of different words, and average length of sentences) and end of year achievement scores. Bougere (1969) demonstrated that the predictive power of the Metropolitan Reading Readiness Test was improved by the addition of linguistic items such as: richness of vocabulary and complexity of syntatic forms. The emphasis on the use of the child's ability to generate grammatical structure has increased in recent years (Cazden, 1968; Brown and Bellugi, 1964; McNeill, 1970). As a result, psychometric instruments such as the Lee Northwestern Syntax Screening Test (1969) have been developed as predictive tools in assessing preschool children's linguistic maturity. As with cognitive variables, predictions using language factors have not been perfect.

A review of the studies dealing with both language and cognitive factors as predictors of later learning performance suggests that additional factors must be taken into account before prediction can be accurate (Faust, 1970). Some of these factors include sex and cultural differences as well as situational and motivational variables (Bayley, 1968). Faust (1970) states also that most studies dealing with cognitive and language factors do not take into account the conditions under which the characteristics of the individual child develop. She emphasizes the need to identify the ways in which given individual characteristics, under certain conditions, but not others, become stabilized into likely school problems.

Emotional and Social Factors

The last of the single variables studied in screening and predictive studies is the child's emotional and social adjustment. This particular area of functioning is somewhat difficult to explain in terms of the information processing model. However, it is best to view an emotional or social handicap in terms of inappropriate output and orientation (Bradley and Gallagher, 1972). A majority of studies in this area have been concerned with the prediction of subsequent academic performance on the basis for evaluation of emotional status at preschool age (Lindemann, 1963; Wattenberg and Clifford, 1964; Meyer, 1953; Ames and Walker, 1964; de Hirsch and Jansky, 1966). Other studies have investigated the influence of variablessuch as, mother-child relationship and temperament in relation to subsequent learning difficulties (Blanchard, 1946; Sperry, 1958; Buxbaum, 1964; Chess, 1965).

In the preschool studies different measures have been used to evaluate the emotional status of the preschooler. Lindemann (1963) based his prognosis on ratings of the social and emotional adjustment of 174 children about to enter kindergarten, using doll play, interviews and a history taken from the mother. Ratings were successful in predicting superior academic adjustment at end of first year, but failed to identify the school failures. Wattenberg and Clifford (1964) explored the relationship of beginning reading achievement with self concept and ego strength at the kindergarten level. Ten of twenty-eight measures of self concept and ego strength were significantly related to later performance. The measures consisted of self reports, kinetic family drawings, sentence completions and ratings by the classroom teacher and an objective observer. In the study by de Hirsch and Jansky, ego strength was also found to be significantly associated with reading and spelling scores thirty months later. Meyer (1953), using the Rorschach Test found that signs such as inaccurate and mediocre global perception, as well as, poor rapport with the environment distinguished failing readers from those who passed. In a follow-up study Ames and Walker (1964) testing Meyer's findings found that the greater use of colour and movement differentiated between low and high achievers.

Several studies pertain to additional variables such as, the mother - child relationship and temperament. Blanchard and Sperry (1958), for example, drew attention to the association between reading difficulties and categories such as parental pathology. Buxbaum (1964) has reported that certain developmental lags in infants seem to be due to a deficiency in the relationship between them and their mothers. Lack of stimulation as well as unrelieved pain and frustration are possible areas in which this deficiency in the relationship is manifested. Chess (1965) in studying the influence of the child's temperament on the learning has concluded that the child's temperament plays a significant role in the nature of his functioning in school. The child's temperamental characteristics affect both the manner in which he approaches the learning task and the way in which he interacts with other children and teachers.

Much criticism has been directed at the use of emotional and social status as a predictor of later academic performance. One of the major criticisms leveled at these empirical studies is that they have not taken into account the developmental stages of child growth and the importance of these developmental sequences in later adjustment. In an attempt to improve the studies in this area, recent researchers such as Call (1970) have strongly recommended the close study of interactional variables. The investigation of the interaction between internal and environmental variables at particular times in the life cycle of the school age child should be given more consideration in future studies.

In this section the findings from studies dealing with single variables of a child's total functioning were presented. These specific variables included: 1) sensory reception, 2) physical motor, 3) perceptual 4) cognitive development, 5) language development and 6) emotional-social development. These empirical studies were also discussed in terms of the functional information processing model presented in

Section I.

In terms of this information processing model, the single variable studies represent a good majority of the processes outlined in the actual model. However, certain deficiencies were noted. In the sensory reception area both hearing and vision were studied, but the literature reveals no evidence of predictive or screening studies using kinesthetic or haptic reception as a predictor variable. Delayed motor development, clumsiness and hyperactivity have been studied as possible predictors in the physical motor area. These represent both motor expressive functions as well as, in the case of hyperactivity, an indication of a control dysfunction. In the perceptual area, central processing in the three major modalities were apparent in early identification studies.

Cognitive processes were dealt with least effectively in early detection studies. Such processes as problem-solving, sequencing and categorization were encompassed under the umbrella of the IQ and were not delineated as separate functions. Language factors which can be classified as speech or verbal expressive functions were very evident in the studies reviewed. Social-emotional factors were also discussed in relation to prediction of subsequent learning. In terms of the information processing model, disruptions in emotional functioning can be best considered as deficits in the output channel.

The review of previous early identification studies within the framework of an integrated information processing model has revealed serious deficiencies on several important areas. Specific deficiencies are apparent in the areas of cognitive processes and experience storage.

Studies employing cognitive and memory tasks were not uncovered in the vast literature of single variable predictors. In addition to these deficiencies, the use of single variables as predictors of subsequent school performance has virtually disappeared from the current literature. Researchers have concluded that the relationships between single, specific variables and later school achievement are simply to low to allow definitive prediction about individual children. Recent investigators have turned to the use of a combination of variables for screening and predictive purposes.

Screening and Prediction Using a Combination of Variables

The trend among researchers toward a more complex approach to the problems of screening and prediction is best reflected in the tendency to devise test batteries that forecast from a broader basis. Most investigators have begun to realize that probably due to the statistical nature of a multivariate approach, a combination of variables yields a higher level of predictive accuracy than any of the isolated variables discussed in the previous section. Recent investigations have therefore focused upon a combination of variables which are predictive of school success or failure. This search for the ideal predictive instrument has resulted in the development of Reading Readiness Tests and Predictive Test Batteries. The review of the literature contained in this section deals with the use of readiness tests and test batteries as predictive instruments. In addition to a discussion of these tests, an attempt will be made to relate the various abilities measured by these instruments to the information processing model presented at the beginning of the review.

Reading Readiness Tests

It has been reported that eighty per cent of the schools in North America use reading readiness tests before exposing children to formal reading instruction (Austin and Morrison, 1963). The stated aims of these tests are to identify pupils likely to fail in primary grades and to pinpoint individual children's deficits in skills believed to be implicated in reading failure. Among the specific skills that contribute to success in first grade are linguistic attainments and aptitudes, visual and auditory perception, muscular coordination and motor skills, number knowledge, and the ability to follow directions and to pay attention in group work.

Although the specific skills listed above are considered important readiness skills, not all readiness tests contain measures of these abilities. In fact the literature in reading readiness indicates that readiness tests vary greatly in the factors they measure. Lowell (1971), in studying samples of existing readiness test batteries, discovered that no two tests use a set of subtests which purport to measure the same factors, yet all claim to measure readiness for reading.

The most commonly used readiness test in North American schools is the Metropolitan Readiness Test (Hildreth, Griffiths and McGauvron, 1969). Maitland, Nadeau and Nadeau (1974), in surveying early school screening practices, found that the Metropolitan Test was used by thirty-six per cent of all school districts doing screening. After the Metropolitan, the next most commonly reported measures were those developed by the local school district. Because of such an extensive use of this particular test, the Metropolitan can justifiably be used to discuss readiness factors in terms of information processing.

The Metropolitan Readiness Test consists of six subtests which measure several important components of first grade readiness. These various components are quite analogous to the processes outlined in the information processing model. Word meaning which is a measure of the child's comprehension and oral language can be classified in the speech or verbal expressive process in the flow of information model. The listening test which strives to tap the child's ability to comprehend phrases and sentences is similar to auditory processing. The Matching tasks contain elements of visual processing and mainly emphasize visual-perceptual skills. The Alphabet subtest can also be considered as a form of visual processing, but also contains elements of auditory processing. The Numbers subtest constitutes a measure of the child's ability to manipulate quantitative relationships and to form concepts. In terms of information processing, problem solving and categorization functions are represented in the Numbers subtest. The last subtest, that of copying is analogous to the expressive function of writing in the information model.

The subtests of the Metropolitan, when examined in relation to the information model, do not represent all of the major processes. As with the single variables discussed previously, haptic processing and long/short term store have not been included in the readiness measures. In addition, behavioural measures such as attention and behavioural control are not, as a rule, included in the readiness test.

The question of using readiness tests as predictors of subsequent school performance is surrounded by just as much ambiguity as the issue of the content of readiness batteries themselves. The predictive studies have been performed in different ways. A review of the recent literature indicates that these investigations have consisted of 1) correlational studies of the relationship between total readiness batteries and subsequent reading success (Dykstra, 1967; Karlin, 1957; Bagford, 1968; Kingston, 1962; de Hirsch and Jansky, 1972), 2) correlational studies of the relationship between various skills measured by subtests and subsequent reading success (Bond and

Dykstra, 1967; Silvaroli, 1965), 3) non-correlational studies which compare a pupil's end of first grade reading achievement with his expected achievement based on readiness test results (Dean, 1939; Thackery, 1965; Easley, 1964; Keogh, 1963).

The research on the use of readiness tests has revealed severe limitations of these tests as a predictive instrument. Lessler and Bridges (1972) conclude that even though the majority of readiness tests should be used for differential diagnoses, reliability studies have demonstrated that a diagnostic profile based on these tests must be considered to be of questionable value. In addition, it appears that perhaps decisions regarding the initiation of reading instruction can be made without administering a complete readiness battery, but by simply using one subtest (Dykstra, 1966). It has been further shown that an experienced teacher after a few weeks with the class can assign children quite adequately to instructional groups (Dykstra, 1967). The state of the use of readiness tests can be best summarized by Lowell (1971) who states that the search must continue for a truly valid set of factors that can be used with a high degree of confidence.

Predictive Test Batteries

As a result of the various limitations of single variables and readiness tests as predictors of school performance, many investigators have turned to predictive test batteries. As mentioned earlier, the authors of these tests have considered them as major contributions to the field of early identification of children with learning difficulties. Only recently have they realized that the addition of new instruments has led to even more confusion and ambiguity in this area. The most recent literature in early detection and screening contains accounts of numerous empirical studies using commercially available predictive test batteries as well as batteries which were devised by the authors to serve a specific purpose for their particular study. Since the choice of the various tests used in these batteries is not based on any kind of conceptual framework, an attempt will be made to relate the subtest components to the information processing model presented in Section I. In this way, deficiencies and omissions in the test batteries may be readily identified.

The first group of studies to be discussed are those in which the authors have employed various combinations of single variables to form an effective predictor. The various tests used range from already existing tests to instruments especially designed by the authors for the particular study. Representative of these studies are the investigations of Haring and Ridgeway (1967), Ferinden, Jacobsen and Linden (1970), Serwer, Shapiro and Shapiro (1972), Hartlage and Lucas (1973), Landrus, Brown and Long (1974) and Badian and Serwer, (1975).

Haring and Ridgeway (1967) screened 1,200 children from 48 kindergarten classrooms for potential learning disorders. Kindergarten teachers were trained to use objective observations of the children's performance in areas such as: a) visual perception, b) eye-hand coordination, c) auditory discrimination, d) visual attention, e) directionality, f) auditory attention span, g) large muscle coordination and h) general language development. A total of 106 children who were considered as high risk as a result of teacher assessment, were further evaluated using psychological and psycholinguistic tests. In information processing terms, the areas measured by the Haring and Ridgeway (1967) study included visual, auditory and haptic processing, visual, and auditory memory, gross and fine motor expression and expressive language abilities. Cognitive processes and the control and regulating mechanisms are the major information processing components which were not included in this testing package.

The results of this mammoth study revealed that teachers were quite accurate in their selection of children with developmental retardation. Correlations between teacher ratings and psychological measures ranged from .48 to .71. In addition, the identifiable communality among the total of the thirty-one variables used was general language ability.

In the study by Ferinden et. al., (1970) sixty-seven kindergarten children were screened for potential learning disorders. The Wide Range Achievement Test and the Human Figure Drawing were found to be reliable instruments for predicting which kindergarten children would not experience success in reading in the first grade. The Bender Gestalt Test and Metropolitan Reading Test were not effective predictors. The predictors in this study were mainly academic in nature and thus, cannot be easily classified in information processing model. Both the Human Figure Drawing and Bender as previously mentioned can be considered as measures of visuo-motor integration.

Serwer et. al. (1972) used the Metropolitan Readiness Test along with additional tasks measuring areas of functioning such as:

a) visual perception, b) auditory discrimination c) visuo-motor ability in an attempt to predict first grade achievement for 300 kindergarten children. The tasks which loaded heavily on the auditory-visual-haptic processing dimension in the information model showed relatively poor predictive value for high risk children (r = .16 to .50).

Hartlage and Lucas ([illegible]73) developed a simple screening test which could be group administered by a classroom teacher to students beginning first grade. The test consists of five sections which deal with a) auditory sequencing, b) auditory spatial skills, c) visual sequencing, d) visual spatial skills, e) visual motor skills and f) combined auditory and visual spatial skills. In information processing terms, this test contains large elements of visual and auditory processing as well as motor expressive functions. The results of this predictive study revealed a significant correlation between the subtests and reading levels as measured by the Wide Range Achievement Test.

Landrus et. al. (1974) used a combination of a teacher - psychologist interview (TPI), the Draw A Person (DAP), Perceptual Forms Battery and the XO Test as a screening battery with kindergarten and Grade One children. The tasks evaluated by these measures are highly perceptual in nature and can thus be categorized into the visual processing component of information processing. The findings suggested that for Grade One screening the Teacher - Psychologist, DAP and Perceptual Forms were superior to the TPI - XO package. ($p < .05$) For kindergarten screening there was essentially no difference between the DAP - Perceptual Forms Package and the XO Test.

Badian and Serwer (1975) screened three hundred kindergarten children using the Goodenough-Harris Draw-a-Man Test, Primary Mental Abilities Test, Metropolitan Readiness Test and a geometric form-copying test. Sixty-two children were selected as having probable learning difficulties. At the beginning of first grade these children were tested with the WISC and the Illinois Test of Psycholinguistic Abilities. The results revealed that the children had average ability. The mean Full Scale WISC IQ score was 103.7 (SD = 8.79) while the group's mean scale score for the ITPA was 36.5 (SD = 3.6) which is close to the standardization mean of 36 (SD = 6.0). At the end of first grade these high risk children scored within the average range on the Metropolitan Achievement Test. The conclusion reached by the authors was that the selection criteria in kindergarten was inadequate.

A summary of these six studies in terms of the various components of the information processing model reveals an emphasis on perceptual processing to the exclusion of measures in cognitive processing and the regulating and control mechanism. The majority of tasks in the test batteries discussed above are perceptual in nature and in only one instance was there an attempt to include visual and auditory memory skills. The absence of short and long term memory tasks, as with the single variables and readiness tests appears to be a severe deficiency in these predictive test batteries.

In the second group of multivariable studies, the authors have either developed or used predictive batteries which are now available commercially (Frankenburg and Dodds, 1967; McKnab and Fine, 1972; Dillard and Landsman, 1967; de Hirsch and Jansky, 1972; Denhoff and Hainsworth, 1971; Mardell and Goldenberg 1975). Frankenburg and Dodds (1967) have developed the Denver Developmental Screening Test in order to provide a simple method of screening for evidence of slow development in infants and preschool children. The test items are grouped into four major areas: gross motor, fine motor, language and personal-social. These areas seem to represent mainly expressive function as outlined in the framework of the information model.

McKnab and Fine (1972) attempted to validate the Vane Kindergarten Test (Vane, 1968) in an early identification study. The Vane Test is divided into three subtests: 1) perceptual motor, 2) vocabulary, 3) Draw A Man Test, and appears to measure both visual processing and verbal expressive functions. Their findings suggested that the correlations obtained were too minimal to make educationally relevant predictions. The multiple correlation between the Vane subtests and achievement measures was .52 thus, accounting for only about 25 per cent of the variance.

Dillard and Landsman (1967) have developed a ten item weighted scale to be used with the Children's Human Figure Drawing Test. These authors have attempted to use this weighted scale to predict which children in kindergarten will experience difficulty in school. Initial results of their study point to the use of the Evanston Early Identification Scale as an early screening device.

De Hirsch and Jansky (1972) have developed a Screening Index which can be used in the early identification of children with potential reading difficulties. The specific tasks included in the Index are as follows: Letter Naming, Picture Naming, Gates Word Matching, Bender Gestalt Test and Binet Sentence Memory. In terms of the information processing model, the test appears to measure auditory and visual processing functions as well as short term memory. Findings from cross validation studies demonstrate the usefulness of this battery in identifying potential failing readers. Eaves, Kendall and Crichton (1972) administered the Screening Index to 228 children at the kindergarten year. The battery distinguished normal children (who passed) from those who failed. Forty-nine children who failed the test were clinically diagnosed as minimally brain-damaged or developmentally immature. Statistical analysis revealed three false positives and one false negative.

Mardell and Goldenberg (1975) have conceptualized and developed a screening test for identifying pre-kindergarten children with potential learning problems. The DIAL (Developmental Indicators for the Assessment of Learning) scale measures six major areas of a child's functioning: sensory capacity, motor skills, affective behaviours, social skills, conceptual skills and language development. In information processing terms, the DIAL scale contains measures of visual, auditory and haptic processing, cognitive processes, language output as well as behavioural measures of orientation and integration. The scale has been standardized on 4,423 children, but predictive validity measures have not yet been carried out.

The major studies discussed thus far have included several components of the information model presented in Section I. However, as it has been demonstrated, many of the information processing categories do not appear in these test batteries. In general the batteries have measured the following areas: 1) motor expression 2) verbal expression 3) visual and auditory processing and 4) short term memory functions.

Denhoff et. al. (1971) were the first to attempt to develop a measure based on an information processing model. The Meeting Street School Screening Test developed by these writers is made up of three subtests that survey children's skills in three major information processing areas: 1) visual-perceptual-motor 2) language and 3) body awareness and control. The MSSST has been used successfully in predicting later school achievement levels of kindergarten and first grade (Denhoff, et. al. 1971).

A review of the major multivariable studies has revealed certain deficiencies in the areas of functioning measured by the various predictive batteries. It already has been pointed out that cognitive, short/long term store and control functions have not been included in specific test batteries. The commercially available batteries appear to suffer from the same deficiencies. However, attempts have been made to include both auditory and visual memory tasks as well as haptic processing functions in these instruments.

In addition to obvious deficiencies in the areas assessed by these instruments, much criticism has been directed at the actual use of psychometric test batteries in predictive studies. Even though the test batteries which have been discussed above, appear quite diverse in their emphasis on many combinations of variables, a closer examination reveals a basic limitation. Each battery is based upon what is essentially a readiness model, i.e. a model which traditionally has emphasized the assessment of a child's deficits with reference to a delimited set of psychological variables such as: perceptual motor and linguistic skills. As a result, while some of these studies using test batteries have yielded significant correlations between predictors and criterion variables, the statistical relationships have been weak particularily when subjected to cross validation procedures.

New Directions for Early Identification

The review of the literature on early identification has revealed the shortcomings of the use of both single and multi-variables to predict school failure. As a result, traditional psycho-educational evaluation is questioned because of its limited educational planning and predictive validity for individual children.

Several authors (Keogh, 1970, 1973; Adelman and Feshbach, 1970, 1973) in proposing alternative approaches and modifications to existing programmes have also questioned the original assumptions upon which early identification is based. These investigators first of all do not maintain that the condition to be identified in early identification is already existent in the child. Rather, they propose that failure can be best viewed as an interaction between child and setting. In regard to the assumption that psychometric data contributes to the prescription of treatment strategies, it has been shown that the development of preventive educational programmes for children identified as high risk is not clear cut nor direct (Ensminger, 1970; Deno, 1971). Only the third assumption, i.e. the sooner the treatment is begun, the greater the impact, remains intact. This has not been disputed by current investigators and remains the raison d' être of early identification programmes.

Thus, rather than suggesting that programmes of early identification be discontinued or curtailed, prominent researchers (Keogh, 1973; Adelman and Feshbach, 1973) have offered several guidelines whereby efforts at early identification can be improved. It has been suggested by these authors that specification and clarification of the evidence used for identifying problems as well as broadening the base of identification data appear as promising directions for change. More specifically, these guidelines as outlined by Keogh include: 1) specification of outcomes, 2) inclusion of task and situation, and 3) assessment of school behaviour.

In regard to specification of outcomes, Keogh maintains that this should be the first step in an early identification programme. One of the operational implications of this specification is that the most efficient and accurate screening measures are those which are close to the criterion or outcome measures in both content and time. The validity of early identification is increased when prediction is made to outcomes which are close in time and based on evaluative measures which tap abilities required in the immediate educational programme. Keogh states further that attempts to make long term predictions are inherently weak since it is not possible to sample the broad spectrum of skills needed for successful school performance years later. Emphasis in early identification should be changed from a future orientation to one that is more concerned with what is needed for success in the present or immediate future.

A second major guideline proposed by Keogh is that the basis for early identification must be broadened from the present almost exclusive focus on child data to consideration of task components and situational variables which affect the child's learning.

Some researchers have made serious attempts to devise instruments and procedures which would facilitate the implementation of this interactional approach to prediction (Adelman and Feshbach, 1970, 1973). These authors go beyond the readiness model by advocating an approach which provides a closer approximation between predictor and criterion. They view a youngster's success or failure in school as a function of the interaction between his strengths and weaknesses and limitations and the specific classroom situational factors he encounters including individual differences among teachers and differing approaches to instruction. Adelman and Feshbach's interactional model infers that success in the first grade depends not only on the youngster's having the necessary skills and behaviours for learning what is being taught, but also on the characteristics of the classroom situation to which he is assigned. Thus, it is hypothesized that the greater the congruity between a youngster's skills and behaviours (as manifested under representative classroom conditions), and those required of him in a specific first grade classroom, the greater the likelihood of success; conversely, the greater the discrepancy between the child's skills and behaviours, and those required in his classroom, the greater the likelihood of failure.

A major implication of this hypothesis is that one effective strategy for predicting failure is to assess the degree to which the kindergarten youngster can successfully cope under classroom conditions with tasks which are as similar as possible to those which he will encounter in the first grade programme. Such an assessment can be accomplished by: 1) evaluating in situ, deficits in or absence of relevant skills, and behaviours in each kindergarten child, 2) evaluating each first grade program to determine the pattern and degree of skills and behaviours which assigned youngsters will find critical in coping with relevant tasks, 3) analyzing the discrepancy between a youngster's skills and behaviours, and what is being required for success in that classroom.

The third major guideline offered by Keogh and perhaps one of the most important, pertains to the choice of data used for early identification. It already has been pointed out that traditional psychometric data has been questioned because of its limited educational planning, and predictive validity for individual children. Keogh (1972) has summarized the limitations of the standardized test battery orientation in assessment and has called for a process oriented behavioural approach to educational evaluation. A behavioural approach to early identification has received support from a number of independent investigators (Cobb, 1972; Fargo, Roth and Gade, 1968; Haring and Ridgeway, 1967; Spivack, Swift and Prewitt, 1971). The conclusions drawn from these studies clearly suggest that systematic observation of children's behaviour in the educational setting provides important data for the early identification of educationally high risk children.

Integrally related to the issue of what data are relevant in early identification is the question of who might best provide that information. Examinations of referral patterns of children with school learning problems demonstrate clearly that the classroom teacher is the major initial source of identification and referral. Such findings are reasonable, for teachers have the closest and most continuous relationship with the child of anyone in the school programme. It appears likely, too, that teachers recognize behaviours, abilities and problems which have relevance to the educational setting. Keogh, therefore recommends that systematic teacher observation become an integral part of early identification studies.

Teacher Ratings in Early Identification

The majority of more recent studies in the early identification of children with behavioural and/or learning disorders contain evidence that teacher observations are surprisingly accurate predictors of future successes and problems. Attempts at the prediction of behavioural problems have been fruitful and have resulted in the construction of well standardized checklists which can be used by the classroom teacher (Spivack, 1973). The validity of teacher assessments in this area has been firmly established and teacher ratings are often included in the referral data on children.

However, empirical validity for the use of teacher ratings in the identification of children with learning difficulties has not been as well established. The studies in this area generally have dealt with the ability of the teacher to select high and low risk children in their classes. However, the effectiveness of teachers' ratings of their pupils on specific behavioural dimensions considered relevant to school tasks has not been adequately demonstrated.

The results of four major studies can be considered as representative of the evidence demonstrating the effectiveness of the teacher's discrimination between low and high risk children (Haring and Ridgeway, 1967; Ferinden, Jacobson and Linden, 1970; Kermonian, 1962; Keogh and Smith, 1970). The terms low and high risk refer to the probability of children developing learning difficulties in later school years. Haring and Ridgeway, in an enormous study dealing with forty-eight kindergarten classes and 2,000 children, requested the teachers to choose one quarter of their children whom they believed to be high risk in the probability of developing learning problems. Final ratings were based upon the teacher's objective, but structured observations of the children's performance on various measures such as gross muscle coordination and verbal fluency. The standardized test profiles which served as the criterion measure indicated that the teacher's observations were useful in selecting children with a developmental retardation. In a similar study (Ferinden, et. al.) teachers were requested to choose the students whom they believed to be high risk and those whom they believed would be most capable of performing at first grade level. Using a group of kindergarten children, they showed that the teachers were 80% effective in predicting potential learning problems at the kindergarten level employing subjective judgement alone.

In the remaining studies (Kermonian, 1962; Keogh and Smith, 1970) the teacher's ability to rate kindergarten children's stages of readiness was studied. Kermonian (1962) conducted a study to determine the validity of teacher judgement of the readiness status of children entering first grade; validity being interpreted in terms of significance of relationships between teacher's estimates and scores of the Metropolitan Readiness Test. The results indicated that the teacher's appraisal of pupil readiness for first grade correlated highly and significantly with the final instrument ($r = .77$). The magnitude of the correlation indicates the effectiveness of teacher evaluations in determining readiness status on a five point scale. Keogh and Smith (1970) in a similar investigation, followed a group of children from kindergarten to the fifth grade of a regular school programme. Among the kindergarten predictive measures, were the

Bender Gestalt Test and teacher evaluation. Teachers were asked to rate the children on a five point scale of readiness. Analyses revealed consistently high and significant relationships between teacher's ratings and subsequent school achievement (r = .65).

These studies have clearly illustrated the importance of teacher's judgements in the identification of high risk children. The key position of the teacher in this area makes teacher recognition of pupil's problems of primary importance, as without teacher recognition, it is unlikely that a given child will be provided special educational services. Keogh and Becker (1973) have emphatically stated that increased awareness of the importance of early recognition of children with potential school learning problems places additional responsibility on classroom teachers in the kindergarten and primary grades in that teachers are being asked to identify problems before they are well developed.

Teacher Rating Scales

Despite the recognition of the major role of teachers in the early identification of children with learning difficulties, relatively little is known about the kinds of behaviours which are predictive of differential patterns of school performance, or of teacher senstivity to these behaviours. Recent attempts, however, have been made to identify specific behaviours which are predictive of school success or failure. These attempts have resulted in a series of relatively new teacher rating scales which deal with academic behaviours necessary for adequate learning.

One of the first attempts in this direction was that of Conrad and Tobiessen (1967). These investigators undertook the development and standardization of a battery of behavioural rating scales designed to identify children at the kindergarten and pre-kindergarten levels, who are likely to achieve and adjust poorly in the elementary grades. The development of the Schenectady Kindergarten Rating Scales (SKRS) was undertaken to meet the needs for economical means of screening large numbers of children, so that remedial or preventive services could be provided as early in their school careers as possible. The scale contains measures of both non-academic (Peer Relationships, Waiting and Sharing, Fearfulness) and academic (Verbal Skill, Clarity of Speech, Use of Material) areas. Several validity studies have been carried out since the scale's initial construction (Conrad and Tobiessen, 1967; Tobiessen, Duckworth and Conrad, 1971). The general concensus arrived at by these investigators is that generally, the SKRS profiles obtained in their studies were only moderately successful predictors of specific first grade performance. The authors have concluded that while the results of the cross validation of SKRS profiles are encouraging, they require replication with other populations and criterion measures.

A second major attempt to develop a pupil rating scale was carried out by Myklebust (1971). The results of his efforts, the Pupil Rating Scale (PRS) measures five areas of behaviour: auditory comprehension, spoken language, orientation, personal-social behaviour and motor coordination. A major advantage of the PRS is its mode of administration. Because the teachers need only consider their present and past observations of a child's behaviours without directly requiring the child to respond, each child can be screened at the teacher's leisure without disrupting her regular schedules. This indirect observation does not cue a child as to what is happening and test contamination factors are not critical in this type of rating procedure.

However, several criticisms have been directed at the Myklebust scale. Broger, (1973) points out that the norms of the PRS are not extensive. The early standardization data available are means and standard deviations for the five PRS subtests, two subtotals and a grand total arranged by grade (3rd and 4th), sex, and group (Learning disabled, borderline and normal control). Clearly, extensive work on norming is necessary. A second weakness is the author's neglect of adequate reliability studies.

A last shortcoming pertains to the direction and guidelines in the test manual. The manual apparently does not provide specific guidelines for scheduling of the PRS. The question whether the teacher completes the scale in the beginning, halfway through, or at the end of the school year is an important one. The increasing familiarity of the teacher with the child as the year progresses may well have a considerable effect on the ratings assigned. As a result of the preceding criticisms, it is unlikely that the PRS in its present form can be considered as a valid instrument which may be used in early identification studies. Broger exclaims that it is surprising that sophisticated researchers would spend so much time on validity and yet totally ignore any measure of reliability.

Another attempt to develop a student rating scale was carried out by Cazier, Giles and Jones (1969). The Individual Learning Disabilities Program Classroom Screening Instrument (CSI) was developed pursuant with the U.S. Office of Education in an attempt to provide a measure which would adequately screen general learning disabilities (Cazier et. al.1969; Meier, 1971). The original form of the CSI consists of 80 items intended to measure possible learning disabilities. Teachers are requested to score the items positively (+) if the behaviour suggested by the item is observed and negatively (-) if the behaviour is not typical of the child. The use of teachers and checklists for such evaluation purposes has been supported by Anderson (1970). The original instrument was subdivided into eight scales: visual, auditory, speech, body/motoric, drawing/writing, reading, relational/conceptual, and social/emotional. Cazier et. al. (1969) concluded that the CSI is generally effective in discriminating between children with learning disorders and children who are normal learners. Meier

(1970) revised the instrument by removing certain items, adding new items, developing a revised scoring procedure, and developing a new set of subscales, thus giving a new perspective to the CSI. The CSI may prove to be a useful instrument in future studies. However, reliability and validity measures need to be obtained and norms need to be established.

Recent attempts have been made to incorporate several of the guidelines offered by Keogh in order to improve early identification studies. As it has been previously mentioned, one of these major attempts has been the work of Adelman and Feshbach. These authors, in proposing their interactional model have constructed several rating scales which may be used in predictive studies. The key component in the scales is the behavioural analysis made by the teacher of those cognitive, affective and social attributes, which on a largely a priori basis have been judged as relevant to success in various school programmes. The teacher's ratings of these behaviours constitutes the first and most important step in their predictive sequence. The uniqueness and strength of their specific rating scales is twofold; first, the use of teacher observations and ratings to assess a broad range of children's behaviours over an extended period of time as contrasted to a single test session, secondly, the similarity between the assessment and criteria settings. These scales have not as yet, been used in early identification studies, but they may prove to be beneficial in our efforts to improve our early identification procedures.

The preceding discussion concerning teacher rating scales has revealed that existing rating scales are not adequate for early identification purposes. Several of the scales were not developed for screening purposes, while others have not yet been used in predictive studies. As a result, the effectiveness of teacher ratings of student behaviours in an early identification study has not yet been demonstrated.

Summary

In this chapter an attempt was made to review the vast and diverse literature in early identification in an organized fashion. An information processing model was offered as a vehicle by which the numerous studies could be presented in a meaningful fashion. A discussion of the studies has uncovered several deficiencies in terms of the various areas of functioning which are included in the information processing model. Furthermore, an examination of recent trends in early detection studies has revealed a tendency to abandon the traditional psychometric methods and replace them with behavioural assessments which can be carried out in the classroom. The teacher's assessment of her student's abilities through the use of behavioural ratings has been one of the important new directions which recent experimenters have recommended. The vehicle by which teachers may carry out these behavioural ratings is the student rating scale. A review of these instruments indicates that the majority of scales have not been devised for early identification purposes. The newer instruments which have been developed for early detection programmes, have not yet been used in predictive studies.

The Problem

The review of the literature on the early identification of children with learning difficulties has revealed a trend towards the use of teacher assessments in the classroom setting. However, empirical validity for the use of teacher ratings in early identification programmes has not been well established. One avenue of research has shown that teachers are extremely accurate in discriminating between low and high risk children. There is little evidence, however, that teacher ratings of their pupils on behavioural dimensions are effective in predicting success or failure in school tasks. One major reason for this lack of predictive validity for teacher ratings is the inappropriateness of existing rating scales for early identification purposes.

The purpose of the present study was twofold. First, an attempt was made to construct a student rating scale for use specifically in the grade one setting, by grade one teachers. The second major thrust of the investigation was to measure the effectiveness of teacher ratings, with the use of this Grade One Scale, in the identification of children with learning difficulties in the grade one classroom.

CHAPTER III

Method

This chapter outlines the various procedures used in the construction of the Grade One Rating Scale and its use in the predictive study to measure the effectiveness of teacher ratings. The chapter begins with information regarding the subjects who participated in the study and a description of the various instruments used. These instruments are described and reasons given for their use. The actual procedures are divided into two major parts: 1) the preliminary work with the initial rating scales and 2) the use of the Grade One Rating Scale in the predictive study.

Subjects

A total of 24 Grade One teachers selected from the Edmonton Public School Board participated in the study. No attempt at random selection was made because of the uncertainty on the part of the investigator of the willingness of the teachers to participate in the study. Therefore, those teachers who consented to take part in the study were selected. A total of 26 teachers were contacted and only two did not wish to participate. Of the 24 teachers who did take part, eight (8) took part in the preliminary portion of the study while sixteen (16) participated in the main study. Demographic data was not obtained on the teachers but they appeared to be representative of Grade One teachers in the Edmonton Public School system. In addition, six staff members from the Department of Educational Psychology at the University of Alberta participated in the first part of the study. All of these staff members were engaged in teaching special education and school psychology courses at the time of the study. The sixteen teachers in the second part of the study completed rating scales for each of a total of 354 Grade One pupils. The results for fifty (50) of these students were eliminated from the data analysis because of incomplete data. Of the remaining 304 pupils, the completed rating scales of one hundred (100) pupils were randomly selected and put aside for use in the cross validation study. The normative sample consisted of 106 boys and 98 girls. The cross validation sample consisted of 56 boys and 44 girls.

Measuring Instruments

The following rating scales served as the basis for items of the Grade One Rating Scale.

Student Rating Scale (Adelman and Feshbach, 1974). This scale includes 41 items dealing with the child's cognitive, affective, and social functioning in the classroom. As mentioned in the preceding section, the key component in the scales is the behavioural analyses made by the teacher of those areas of a child's functioning which have been judged by the authors as relevant to the child's success in various school programmes. Each item in the scale is rated from 1 to 5 with the lower scores reflecting deficits and the higher scores, competencies in the particular behaviour being assessed. This particular scale was chosen for use in the investigation for several reasons. Firstly, the current literature has suggested that this type of scale may prove to be beneficial in our efforts to improve our early identification procedures. Secondly, the Grade One version of this scale has not yet been used in an early identification study. The Student Rating Scales were not commercially available at the time of the study and were obtained directly from the authors. The Student Rating Scale can be found in Appendix A.

Pupil Rating Scale (Myklebust, 1971). This scale was developed as a screening instrument which could be used to identify children who have deficiencies in learning. The Pupil Rating Scale was standardized on a sample of third and fourth graders in suburban schools. The scale yields eight scores: a) auditory comprehension b) spoken language c) orientation d) motor coordination e) personal-social behaviour f) verbal subtotal g) non-verbal subtotal and h) total score. Research has indicated that the PRS is significantly correlated with achievement measures such as reading and spelling (r = .16 to .53) (Myklebust, 1971). The PRS was included in the study because of its clarity and detail in presenting the various items. In addition, as with the Adelman and Feshbach (1971) Scales, the PRS has not yet been used with a Grade One population in a predictive study. The Pupil Rating Scale can be found in Appendix B.

Supplementary Items. A series of 44 items were also used to augment the items of the Student and Pupil Rating Scales. The source of these items was a behavioural checklist devised by McCarthy (1972) for use by teachers as an informal observation guide for the detection of psycholinguistic learning disabilities (see Appendix C).

The following tests served as criterion measures in the validation of the Grade One Rating Scale.

Stanford Achievement Test. (Kelley, T.L; Madden, R; Gardner, E.F. & Radman, H.C., 1965). The four reading subtests in the Primary I battery were used as criterion measures in the study. These tests are discussed in greater detail below.

Word Reading Test. This subtest consists of 35 items, graduated in difficulty, which measure the ability of a pupil to analyze a word without the aid of context. The pupils are required to look at a picture and then select the word which stands for the picture from a group of four words.

Paragraph Meaning Test. This test consists of a series of paragraphs, graduated in difficulty, from each of which one or more words have been omitted. The pupil's tasks is to demonstrate his comprehension of the paragraph by selecting the proper word for each omission from four alternative choices.

Vocabulary Test. This subtest is a measure of the child's understanding of concepts and terms. A multiple choice type of item is used in which the pupil is required to select from a series of three alternatives the proper answer to a question or a statement read by the teacher.

Word Study Skills Test. This subtest consists of items which measure the child's functioning in the following areas: 1) auditory perception of beginning sounds 2) auditory perception of ending sounds c) phonics and d) rhyming words and phonograms.

Edmonton Public Schools Arithmetic Test. This arithmetic test was also used as a criterion measure in the study. The test measures arithmetic concepts presently being taught in Grade One classrooms in the Edmonton Public School System. The test assesses the following areas of arithmetic ability: 1) operations 2) order

3) numbers and numerals 4) numeration and 5) applications and geometry. Both the arithmetic test and the Stanford Reading Tests are administered to all Grade One students in the Edmonton Public Schools and serve as standardized measures of the child's level of achievement in arithmetic and reading. For these reasons the pupil's results on these particular tests were considered to be the most valid indicators of the child's lvel of achievement at the end of the Grade One year. Hence the pupils scores on these instruments served as criterion measures for this study.

Metropolitan Readiness Test. This test has already been discussed in Chapter Two and was included in the study to provide further validation of the Grade One Rating Scale. The Metropolitan Readiness Test was devised to measure the extent to which school beginners have developed in the several skills and abilities that contribute to readiness for first grade instruction. The following skills and abilities are measured: a) word meaning b) listening c) matching d) alphabet e) numbers and f) copying. Individual scores are calculated for each of the subtests and , in addition, provision has been made for combining these scores to give a Total Readiness Score.

Procedure

The study consisted of two parts. In the first part, a preliminary examination of the scales was carried out by teachers and special education/school psychology specialists. In the second part, the resultant scale was used by another group of Grade One teachers.

Part One In the first part of the study, which was initiated in December of the current school year, eight grade one teachers were asked to examine the items from both the Pupil Rating and Student Rating

Scales along with the supplementary items from the McCarthy checklist. They were asked to determine which items could be readily answered and which items applied to activities in their classrooms. An item was eliminated if 6 out of 8 (75%) of the teachers did not affirm its applicability. The six staff members in special education/school psychology were also asked to examine the scales, in order to determine which items appeared to tap the various aspects of the child's functioning which are relevant to his learning ability. An item was eliminated if 5 out of 6 (80%) of the experts did not consider it relevant. In addition to this examination of specific items, both the teachers and experts were asked to give general comments regarding the scales in their original forms and the format which they felt the final scale should take.

Part Two As a result of this preliminary work with the original scales, a resultant scale of 60 items emerged (see Appendix D). This scale, the Student Rating Scale took the general form of the Myklebust scale, in which each of the possible responses from 1 to 5 are accompanied by a descriptive statement. The resultant scale was then distributed to sixteen Grade One teachers in the first week of February of the school year. The teachers were asked to complete the Student Rating Scale for each of the students in their classes. Before the teachers completed the ratings on each of her pupils, they were asked to divide their classes into five groups. Grouping was determined by the child's present academic functioning in the classroom. They were then requested to assign a rank of 5 to those pupils in the highest group and a rank of 1 to those in the lowest group. Rating scales were completed for a total of 354 Grade One pupils. Informal sessions were held with each teacher in order to explain the method for completing the scales. There was a three-week interval between the distribution and collection of the rating scales.

The criterion measures were administered as part of the system wide standardized testing programme carried out during the last week of May and first week of June, 1975. The Metropolitan Readiness Test had already been administered in October, 1974.

Data Analysis

Factor analysis and multiple linear regression analysis constituted the major analyses of the data. A principal components analysis (Harman, 1960) was performed on the correlation matrix obtained from the 60 item Student Rating Scale. A varimax orthogonal rotation was then applied to the principal axes factors. Subtests were established as a result of the factor analyses and internal consistency measures were obtained for each subtest. The nine factor scale to emerge as the result of the factor analysis was labelled the Grade One Rating Scale (see Appendix E). Subtest or factor scores were then obtained for each subject. Factor scores were calculated by summing the pupil's rating on each item loading on that specific factor. A step-wise multiple regression analysis (Draper and Smith, 1966) using the Grade One Rating Scale subtests (factor) scores as predictors and the Stanford Reading and Arithmetic Test scores as criteria was then performed. The multiple correlation coefficients obtained from these analyses were then cross validated according to the procedure outlined by Tatsuoka (1969). Several additional steps were also taken to demonstrate the predictive efficiency of the Grade One Rating Scale. First of all, Pearson Product-Moment Correlation Coefficients were calculated between the total score of the Metropolitan Readiness Test and all of the criterion measures. Secondly, Pearson correlations were calculated between the teacher ranked groupings of their pupils and their subtest scores on the Grade One Rating Scale. Lastly, a step-wise regression was performed with the Metropolitan Readiness Test included as one of the predictor variables.

CHAPTER IV

Results

Factor Analysis

The purpose of factor analysis in this study was to investigate the factor structure of the items in the Grade One Rating Scale in order to determine what factors were present in the sixty variables. The rationale was that factor analysis would generate factors which would serve as the basis for possible subtests of the Grade One Rating Scale.

A principal components factor analysis was performed on the raw scores obtained from the Grade One Rating Scale. The principal components analysis yielded eleven roots (see Table 1). Since the first nine factors had roots greater than unity, it was decided to use these factors for further interpretation. A varimax orthogonal rotation was then applied to the principal axes factors. The obtained varimax factor structure shown in Table 2 yielded nine factors considered suitable for interpretation. The obtained factor structure accounted for a cumulative percentage of variance of 71.74 per cent. Loadings of .30 and above were considered relevant for interpretation and are referred to in detail in the following discussion.

Since the integrated information processing model presented in Chapter 2 has been used to discuss previous early identification studies, it was decided that the model could also be used to describe the various factors extracted from the items of the Grade One Rating Scale. Therefore the variables and factors described below are discussed in the information processing terminology.

Table 1

Variances of the Latent Roots for Principal Component Analysis after Varimax Rotation

		Percent Variance Accounted For	
Component	Root	Common	Total
1	29.348	25.11	18.75
2	3.623	17.79	13.29
3	2.240	14.58	10.89
4	1.723	9.22	6.90
5	1.500	8.47	6.33
6	1.284	7.07	5.28
7	1.192	5.23	3.91
8	1.108	3.68	2.75
9	1.027	3.06	2.29
10	0.968	2.97	2.22
11	0.796	2.80	2.01

Total Percentage of Variance Accounted for: 74.68

Table 2

Varimax Loadings on Nine Factors
(Decimal point omitted)

CENTRAL PROCESSING FACTOR	1	2	3	4	5	6	7	8	9	h2
Visual Discrimination-Words	66									72
Visual Memory-Words	71									76
Visual Memory-Numbers	49									67
Visual Memory-Shapes	50									69
Visual Memory-Patterns	46									73
Auditory Discrimination-Consonants	72									79
Auditory Discrimination-Vowels	72									74
Auditory Discrimination-Words	75									81
Auditory-Visual Association-Sounds	68									77
Auditory-Visual Association-Sounds and Letters	75									80
Auditory-Visual Association-Letters and Sounds	75									77
Laterality	62									65
LANGUAGE AND COGNITIVE FACTOR										
Comprehending Word Meanings		58								74
Following Instructions		39								74
Comprehending Class Discussions		51								73
Retaining Information		51								77
Comprehending Stories		55								71
Vocabulary		74								79
Grammar		67								71
Word Recall		68								75
Relating Experiences		71								79
Formulating Ideas		66								78
Storytelling		66								72
Clarity of Speech		59								65

Table 2 Continued

CLASSROOM BEHAVIOUR FACTOR	1	2	3	4	5	6	7	8	9	h^2
Auditory Attention			51							79
Visual Attention			45							78
Perseverance			51							79
On Task Behaviour			39							72
Independence			31							67
Discipline			78							77
Working with Classmates			76							73
Cooperation			77							72
Attention			54							80
Organization			47							77
Behaviour in New Situations			46							59
Completion of Assignments			50							73
Tactfulness			81							71
AUDITORY MEMORY FACTOR										
Auditory Memory-Immediate				52						78
Auditory Memory-Short Term				56						81
Auditory Memory-Long Term				63						80
GROSS MOTOR FACTOR										
General Coordination					79					84
Balance					85					87
Manual Dexterity					77					85
FINE MOTOR FACTOR										
Printing						64				76
Colouring						73				75
Copying						44				71
VISUAL DISCRIMINATION I FACTOR										
Visual Discrimination-Colours							77			71
Visual Discrimination-Letters							50			73

Table 2 Continued

CONTROL FACTOR	1	2	3	4	5	6	7	8	9	h^2
Perseveration								69		70
Working with Adults								61		73
VISUAL DISCRIMINATION II FACTOR										
Visual Discrimination-Pictures									57	74
Tracing									38	78

Nine Factors account for 71.74 percent of the variance

Factor 1: Central Processing Factor (CP)

Factor 1 accounts for 25.11 per cent of the variance and can be labelledas the Central Processing factor (CP). The variables which load highly on this factor include those items measuring visual discrimination, auditory-visual association and laterality. In information processing terms these items represent visual, auditory and haptic processing as well as short term visual memory. Because of the high loadings on these variables, Factor I is best labelled as the Central Processing factor.

Factor 2: Language and Cognitive Factor (LC)

Factor 2 accounts for 17.79 per cent of the variance and has high loadings an expressive language and cognitive variables. For this reason, Factor 2 can be interpreted as the Language and Cognitive factor (LC). The language items loading on this factor include vocabulary, clarity of speech, story-telling and relating experiences. The major cognitive variables consist of comprehension, formulating ideas, and following instructions. In information processing terms, Factor 2 can be considered as measuring verbal output and the cognitive processes of association, and ordering and relating.

Factor 3: Classroom Behaviour Factor (CB)

Factor 3 is the third largest of the nine obtained varimax factors, accounting for 14.58 per cent of the variance. This factor has high loadings on variables which represent important behaviours displayed by children in the classroom. The behaviours included in Factor 3 are prerequisites for adequate classroom functioning. Items measuring behaviours such as perseverance, on task behaviour, cooperation and attention load heavily on this factor which has been labelled Classroom Behaviour (CB). These behaviours are best considered as correlates of the control and regulating mechanism in the information processing model. If a child displays a low level of functioning on these behaviours, loss of behavioural control usually results and this in turn causes a disruption in the child's learning process.

Factor 4: Auditory Memory Factor (AM)

Factor 4 accounts for 9.22 per cent of the variance and has loadings on variables measuring auditory memory. For this reason it can simply be labelled as the Auditory Memory factor (AM). In information processing terms this factor assesses short and long term auditory memory in the experience storage component.

Factor 5: Gross-Motor Factor (GM)

Factor 5 accounts for 8.47 per cent of the variance and has been labelled as the Gross-Motor factor. Items measuring general coordination, balance and manual dexterity load heavily on this factor. In information processing terms, haptic processing is measured by the variables loading on Factor 5.

Factor 6: Fine-Motor Factor (FM)

Factor 6 accounts for 7.07 per cent of the variance and can be labelled as the Fine-Motor factor. The items which load heavily on Factor 6 include printing, colouring and copying. The output channel of writing and printing in the information processing model is represented by Factor 6.

Factor 7: Visual Discrimination Factor (VDI)

Factor 7 accounts for 5.23 per cent of the variance and has been labelled as the Visual-Discrimination factor (V-DI). The items measuring visual discrimination of colours and letters load heavily on Factor 7. Visual processing is represented by Factor 7 in the information processing terminology.

Factor 8: Control Factor (C)

Factor 8 accounts for 3.68 per cent of the variance and can be labelled as the Control factor (C). Variables such as perseveration and working with adults load heavily on Factor 8. In the information processing model, Factor 8 represents still another aspect of the control and regulating mechanism. Items loading on Factor 8 are somewhat similiar to those loading on Factor 3, the Classroom Behaviour factor (CB).

Factor 9: Visual Discrimination Factor (VDII)

Factor 9 accounts for 3.06 per cent of the variance and can be labelled as another Visual Discrimination factor. Factor 9 differs from Factor 7 in regard to academically meaningful stimuli involved in the visual discrimination process in Factor 7. In the items loading in Factor 7, the child is rated on his ability to discriminate between colours and between different letters. The items in Factor 9 deal with less academically oriented stimuli such as pictures and objects.

In addition to the principal components factor analysis performed on the total sample of 354 girls and boys, another analysis was also carried out for boys and girls separately. The varimax rotation yielded similar factors for both girls and boys separately. The extracted factors were identical to the factor structure for the combined sample. However the factors were extracted in a different order for boys and girls. The results of the separate analysis can be found in Appendix G. For boys, the factors were extracted in the following order: 1) Central Processing,2) Language and Cognitive 3) Classroom Behaviour 4) Control 5) Gross-Motor 6) Fine-Motor 7) Visual-Discrimination (I) 8) Auditory Memory and 9) Visual-Discrimination (II). For girls the nine factors were extracted in the following order: 1) Central Processing 2) Classroom Behaviour 3) Gross-Motor 4) Fine-Motor 5) Language and Cognitive 6) Auditory Memory 7) Visual Discrimination (I) 8) Control 9) Visual Discrimination (II).

The factor analyses of the 60 items of the Student Rating Scale resulted in the formation of a new 52 item,nine subtest scale called the Grade One Rating Scale (see Appendix E). Subtest and total scores were calculated for each subject; these scores were then used in the multiple regression analysis. Table 3 shows the internal consistency estimates for each of the nine subtests.

Multiple Regression Analysis

Multiple regression is generally used whenever one wishes to make quantitative predictions on some criterion variable on the basis of scores on several predictor variables. The purpose of multiple regression in this study was to determine which combination of subtests of the Grade One Rating Scale was most predictive of the various achievement measures. Multiple regression essentially deals with the calculation of weights which produce the maximum possible correlation between the criterion variable and the weighted sum of two or more predictor variables.

Table 3

Internal Consistency Estimates for the Nine Subtests of the Grade One Rating Scale

Subtest	Reliability Estimate[a]
Central Processing	.419
Language and Cognitive	.374
Classroom Behaviour	.337
Auditory Memory	.327
Gross Motor	.646
Fine Motor	.379
Visual Discrimination I	.421
Control	.424
Visual Discrimination II	.235

[a] Reliability estimate calculated by squaring and summing the factor loadings for each factor over the number of variables in that factor.

The results of the step-wise regression analysis are presented in Tables 4, 5 and 6. Table 4 summarizes the regression analysis for the combined boys and girls. For the Word Reading subtest, the Central Processing, Visual Discrimination II and Control subtests of the Grade One Rating Scale were significant predictors. For Paragraph Meaning the following subtests proved to be effective predictors: Central Processing, Visual Discrimination II, Language and Cognitive subtest and Control. These same subtests were also significantly correlated with both the Vocabulary and Word Study Tests. For Total Reading Achievement, once again these same four subtests proved to be the most statistically significant predictors. In regard to the Arithmetic Test, only three of the subtests were found to be effective predictors; the Control subtest did not appear in the regression equation. However, the four subtests - Central Processing, Visual Discrimination II, Language and Cogitive and Control, once again proved to be significant predictors for overall achievement. These same four subtests generally appeared as statistically significant predictors for the majority of criterion measures.

Table 5 presents the predictors and their corresponding weights for the sample of boys only. For the Word Reading Test, the Central Processing, Language and Cognitive and Visual Discrimination II subtests proved the most significant predictors. With regard to the Paragraph Meaning Test, the Language and Cognitive Auditory Memory, Control and Visual Discrimination II subtests contributed to the regression equations. The Language and Cognitive subtest was the only

Table 4

Summary of Step-Wise Regression Analysis of the Grade One Rating Scale as Predictor and Achievement Measures as Criterion for Combined Sample of Boys and Girls (n=204)

		Weights					
Predictor(s)	Criterion	b_1	b_2	b_3	b_4	Constant (a)	F
CP, VDII, C	Word Reading	.59	-.56	-.82		7.86	73.17**
CP, VDII, LC, C	Paragraph Meaning	.66	-.25	.32	-.13	0.39	55.95**
LC, VDII, CP, C	Vocabulary	.27	-1.22	.23	-.69	15.55	20.97**
CP, VDII, LC, C	Word Study	.66	-1.51	.23	-.79	18.60	52.79**
CP, VDII, LC, C	Total Reading	2.13	-5.05	.88	-3.02	40.05	80.16**
CP, VDII, LC	Arithmetic	.36	-1.12	.18		29.75	44.47**
CP, VDII, LC, C	Total Achievement	2.05	-6.16	1.07	-3.28	71.27	89.65**

Note: Abbreviations are as follows: CP = Central Processing; VDII = Visual Discrimination II; C = Control; LC = Language and Cognitive Factor

*$p < .05$

**$p < .01$

Table 5

Summary of Step-Wise Regression Analysis of the Grade One Rating Scale as Predictor and Achievement Measures as Criterion for Boys ($n = 106$)

Predictor(s)	Criterion	Weights				Constant (a)	F
		b_1	b_2	b_3	b_4		
CP, LC, VDII	Word Reading	.45	.19	-1.03		3.48	33.68**
LC, AM, C, VDII	Paragraph Meaning	.59	1.31	.98	-1.40	2.45	29.41**
LC	Vocabulary	.29				10.18	13.53**
CP, LC, VDII	Word Study	.49	.46	-1.74		11.70	38.50**
CP, LC, C, VDII	Total Reading	1.57	1.49	-2.59	-5.20	37.04	41.10**
CP	Arithmetic	.42				26.39	53.92**
CP, LC, VDII	Total achievement	1.86	1.66	-6.32		49.76	57.48**

Note: Abbreviations are as follows: CP = Central Processing; LC = Language and Cognitive Factor; VDII = Visual Discrimination II; AM = Auditory Memory; C = Control

*$p < .05$

**$p < .01$

predictor significantly correlated with the Vocabulary Test. In regard to the Word Study Test, the same subtests that were found to be statistically significant predictors for the Word Reading Test were also identified as highly correlated with Word Study Skills. For Total Reading Achievement, the following subtests were significant predictors: Central Processing, Language and Cognitive, Control and Visual Discrimination II. These predictors were identical to those found to be predictive of total reading ability for the combined sample. The Central Processing subtest proved to be the only effective predictor for the Arithmetic Test. For Total Achievement, the Central Processing, Langague and Cognitive, and Visual Discrimination II subtests were effective predictors. These subtests, with the exception of the Control subtest are identical to those subtests found to be significant predictors of total achievement for the combined sample of boys and girls. The subtests identified as effective predictors of the achievement criteria for boys are similar to those for the combined sample. The Auditory Memory subtest is the only additional subtest appearing in the regression equation for one of the criterion (Paragraph Meaning Test).

Table 6 summarizes the regression analysis for girls. For the Word Reading Test, the Central Processing, Control and Visual Discrimination II subtests were statistically significant predictors. The Central Processing, Fine-Motor and Visual Discrimination II subtests were significantly correlated with the Paragraph Meaning Test. For the Vocabulary Test, the Central Processing, Language and Cognitive, Auditory Memory and Visual Discrimination II subtests were effective

Table 6

Summary of Step-Wise Regression Analysis of the Grade One Rating Scale as Predictor and Achievement Measures as Criterion for Girls (n =98)

Predictor(s)	Criterion	Weights				Constant (a)	F
		b_1	b_2	b_3	b_4		
CP, C, VDII	Word Reading	.60	-1.13	-.76		11.63	31.86**
CP, FM, VDII	Paragraph Meaning	.99	-.85	-1.77		-2.81	40.65**
CP, LC, AM, VDII	Vocabulary	.43	+.38	-.37	-.54	7.93	16.34**
CP, C, VDII	Word Study	.80	-1.44	-1.30		25.82	36.24**
CP, C, VDII	Total Reading	2.90	-3.80	-5.07		48.40	55.42**
CP, C, VDII	Arithmetic	.51	-.75	-1.08		36.70	24.83**
CP, C, VDII	Total Achievement	3.41	-4.57	-6.14		85.02	65.01**

Note: Abbreviations are as follows: CP = Central Processing; C = Control; VDII = Visual Discrimination; FM = Fine Motor; AM = Auditory Memory.

*$p < .05$

**$p < .01$

predictors. For the remaining criterion measures, the Central Processing, Control and Visual Discrimination II subtests proved to be the most effective predictors.

The interesting finding arising from the step-wise analysis for girls is the notable absence of the Language and Cognitive Subtest as a significant predictor in the regression equations for all but one criteria. This seems to suggest little variability in scores for girls on this subtest. It appears that girls were rated in a uniform manner on the Language and Cognitive subtest by their teachers. With the exception of the Language and Cognitive subtest, the three subtests which were identified as effective predictors for girls, i.e. Central Processing, Control and Visual Discrimination II, also appeared as significant predictors in the regression analysis for both the combined sample and for boys separately. The only additional predictor uncovered by the step-wise regression for girls is the Fine Motor subtest which appeared as a predictor for the Paragraph Meaning Test.

Table 7 presents the multiple correlations between the subtests of the Grade One Rating Scale and the criterion measures. For the combined sample of boys and girls, the multiple correlations for the combination of predictors on the various achievement measures ranged from a low of .55 for the Vocabulary Test to a high of .84 for total reading achievement. The R obtained for the Word Reading Test was .71; for the Paragraph Meaning the multiple correlation was .73; for the Arithmetic Test the multiple correlation obtained was .60 while

Table 7

Multiple Correlations (R) Between Subtests of Grade One Rating Scale and Achievement Measures

Predictors	Criterion	R	F - Ratio
	Boys and Girls Combined (n = 204)		
CP, VDII, C	Word Reading	.71	28.01**
CP, VDII, LC, C	Paragraph Meaning	.73	31.57**
LC, VDII, CP, C	Vocabulary	.55	9.53**
CP, VDII, LC,C	Word Study	.70	26.90**
CP, VDII, LC, C	Total Reading	.84	65.33**
CP, VDII, LC	Arithmetic	.60	15.75**
CP, VDII, LC, C	Total Achievement	.80	49.97**
	Boys (n = 106)		
CP, LC, VDII	Word Reading	.75	17.81**
LC, AM, C, VDII	Paragraph Meaning	.73	15.78**
LC	Vocabulary	.43	3.07*
CP, LC, VDII	Word Study	.71	14.00**
CP, LC, C, VDII	Total Reading	.77	20.10**
CP	Arithmetic	.63	8.95**
CP, LC, VDII	Total Achievement	.78	21.00**
	Girls (n= 98)		
CP, C, VDII	Word Reading	.73	14.40**
CP, FM, VDII	Paragraph Meaning	.75	16.36**
CP, LC, AM, VDII	Vocabulary	.63	8.22**
CP, C, VDII	Word Study	.72	13.38**
CP, C, VDII	Total Reading	.78	19.28**
CP, C, VDII	Arithmetic	.67	8.57**
CP, C, VDII	Total Achievement	.81	23.87**

*$p < .05$
**$p < .01$

the R obtained for the total achievement criterion was .80. All of the multiple correlations were significant at the .01 level.

The multiple correlations calculated for the sample of boys as also shown in Table 7 ranged from a low of .43 for the Vocabulary Test to a high of .78 for total achievement. The R calculated for the Word Reading Test was .75; for the Paragraph Meaning Test the multiple correlation was .73; the R calculated the Word Study Test was .71; the multiple correlation for the total reading criteria was .77 while the R calculated for the Arithmetic Test was .63. Again, all of the multiple correlations with the exception of the R for the Vocabulary Test achieved statistical significance at the .01 level. The remaining multiple correlation was significant at the .05 level.

Also shown in Table 7 are the multiple correlations calculated for the sample of girls. The multiple correlations for girls ranged from .63 for the Vocabulary Test to .81 for the total achievement criteria. The remaining multiple correlations included .73 for the Word Reading Test, .75 for Paragraph Meaning, .72 for Word Study, .78 for total reading achievement and .67 for the Arithmetic Tests. All the multiple correlations calculated for girls were significant at the .01 level.

Cross Validation

Cross validation is a standard procedure which is carried out in conjunction with regression techniques. Tatsuoka (1969) states that it is necessary to cross validate the obtained regression equation on an independent sample in order to arrive at a more accurate estimate of the efficiency of actual predictions by the equation.

The cross validation procedure outlined by Tatsuoka (1969) consists of the following steps. First of all, a certain fraction of the total original sample is set aside for cross validation purposes. In this study, teacher ratings on 100 pupils were randomly selected and put aside as the cross validation sample. Secondly, the regression equation that has been constructed on the basis of the normative sample is used for predicting the criterion score (Y') for each member of the cross validation sample. Next, an ordinary product moment correlation coefficient between Y' and the actual score (Y) is calculated. The result is called the cross-validation multiple R symbolized by Rc.

Tatsuoka (1969) contends that if the magnitude of Rc is reasonably close to that of R' (the multiple-R corrected for shrinkage), then in subsequent samples too, the predictive efficiency will be more or less of the same degree. Table 8 presents the multiple correlations corrected for shrinkage (R') and cross validation multiple correlations (Rc) for the cross validation sample.

Additional Validity Measures

In order to demonstrate further validity for the Grade One Rating Scale, product moment correlations were calculated between teacher ranked groupings of their pupils and the Grade One Rating Scale subtests. Table 9 presents the Pearson product moment correlation coefficients between teacher rankings and the subtests of the Grade One Rating Scale for the combined sample and for boys and girls separately. For the

Table 8

Multiple Correlations Corrected for Shrinkage (R') and Cross-Validation Multiple Correlation (Rc) for Cross-Validation Sample

Predictors	Criterion	R'	Rc
	Boys and Girls (n = 100)		
CP, VDII, C	Word Reading	.70	.63
CP, VDII, LC, C	Paragraph Meaning	.73	.72
LC, VDII, CP, C	Vocabulary	.55	.32
CP, VDII, LC, C	Word Study	.70	.70
CP, VDII, LC, C	Total Reading	.83	.75
CP, VDII, LC	Arithmetic	.59	.58
CP, VDII, LC, C	Total Achievement	.79	.77
	Boys (n = 56)		
CP, LC, VDII	Word Reading	.72	.58
LC, AM, C, VDII	Paragraph Meaning	.70	.64
LC	Vocabulary	.59	.57
CP, LC, VDII	Word Study	.68	.68
CP, LC, C, VDII	Total Reading	.75	.72
CP	Arithmetic	.59	.52
CP, LC, VDII	Total Achievement	.76	.74
	Girls (n = 44)		
CP, C, VDII	Word Reading	.70	.66
CP, FM, VDII	Paragraph Meaning	.72	.77
CP, LC, AM, VDII	Vocabulary	.59	.62
CP, C, VDII	Word Study	.69	.72
CP, C, VDII	Total Reading	.76	.77
CP, C, VDII	Arithmetic	.64	.64
CP, C, VDII	Total Achievement	.79	.78

Table 9

Pearson Product Moment Correlation Coefficients Between Teacher Ranked Groups and Grade One Rating Scale Subtests

	Boys & Girls (n=204)		Boys (n=106)		Girls (n=98)	
Subtests	r	t-value	r	t-value	r	t-value
Central Processing	.80	18.78**	.75	11.48**	.84	15.09**
Language and Cognitive	.80	19.25**	.77	12.48**	.83	14.33**
Classroom Behaviour	.68	13.13**	.57	7.07**	.76	11.47**
Auditory Memory	.75	16.38**	.66	8.98**	.83	14.64**
Gross Motor	.50	8.13**	.51	6.12**	.45	5.02**
Fine Motor	.56	9.67**	.50	5.88**	.59	7.24**
Visual Discrimination I	.52	8.67**	.52	6.25**	.50	5.60**
Control	.33	4.92**	.22	2.29**	.41	4.40**
Visual Discrimination II	.54	9.14**	.45	5.16**	.61	7.51**
Total Score	.82	20.64**	.76	12.23**	.87	16.97**

*p $<$ .05

**p $<$ .01

combined sample, the correlation coefficients ranged from .33 for the Control subtest to .82 for the Total Rating Scale score. The Pearson correlations for boys ranged from .22 for the Control subtest to .77 for the Language and Cognitive subtest. The correlation coefficients obtained for girls ranged from .41 for the Control subtest and .87 for the Total Rating Scale score. All of the correlation coefficients were significant at the .01 level. The findings reveal a significant relationship between teacher grouping of her pupils and her ratings of the same pupils on specific behavioural dimensions.

As another validity check, Pearson product moment correlations were calculated between the Metropolitan Readiness Test total score and the seven criterion measures. Table 10 presents these correlations for the combined sample and for boys and girls separately. For the combined sample, the correlation coefficients ranged from .54 for the Paragraph Meaning Test to .70 for the Total Achievement criteria. The correlations for boys ranged from .51 for the Paragraph Meaning Test and .68 for Total Achievement. The coefficients between the Readiness Test Total score and achievement criteria for girls ranged from .57 for the Word Reading Test and .73 for Total Achievement. All of the correlation coefficients were significant at the .01 level.

A comparison between the Pearson product moment correlations obtained between the Metropolitan Test total score and criteria (see Table 10) and the multiple correlations between the Grade One Rating Scale subtests and criteria (see Table 7) reveal that sixteen (16) out of twenty-one (21) multiple correlations are larger than the corresponding product moment correlation coefficients. Only four

Table 10

Pearson Product Moment Correlation Coefficients Between the Metropolitan Readiness Test Total Score and Criterion Measures

	Boys & Girls (n=204)		Boys (n=106)		Girls (n=98)	
Criterion Measures	r	t-value	r	t-value	r	t-value
Word Reading	.58	10.10**	.59	7.40**	.57	6.74**
Paragraph Meaning	.54	9.20**	.51	6.05**	.58	7.06**
Vocabulary	.59	10.38**	.53	6.46**	.66	8.66**
Word Study	.62	11.48**	.62	8.09**	.63	8.03**
Total Reading	.67	12.92**	.64	8.68**	.70	9.65**
Arithmetic	.62	11.31**	.59	7.53**	.67	8.81**
Total Achievement	.70	14.06**	.68	9.36**	.73	10.68**

**p < .01

correlation coefficients were larger than the corresponding multiple correlations while in one case both correlations were identical. For the combined sample and for boys and girls separately, the Pearson correlation coefficients (r) for the Vocabulary Test were larger than the corresponding multiple correlations (R). For the combined sample the correlation coefficient was .59 while the multiple correlation was .55; for boys, r = .53 and R = .43 while for girls r = .66 and R = .63. In addition, for the combined samples, the correlation coefficient between the Readiness Test and Arithmetic Test (r = .62) was larger than the multiple correlation (R = .60). In one case i.e. for the Arithmetic Test in the girl's sample, both the correlation coefficient and multiple correlation were identical (R = r = .67).

As a last validity measure for the Grade One Rating Scale, the step-wise regression procedure was carried out on the combined normative sample with the Metropolitan Readiness Test included as a predictor variable along with the subtests of the Grade One Rating Scale. The Readiness Test was used in this way in order to determine whether this test contributed to the predictive efficiency of the regression equations calculated in the first regression analysis. Table 11 presents the summary of the step-wise regression analysis with both the Readiness Test and Grade One Rating Scale as predictors and the achievement measures as criterion.

The findings reveal that the Metropolitan Readiness Test appears in the regression equation for six of the seven criteria. For both the Word Reading and Word Study tests, the Metropolitan Test along

Table 11

Summary of Step-Wise Regression Analysis of the Grade One Rating Scale and Metropolitan Readiness Test as Predictors and Achievement Measures as Criterion for Combined Sample of Boys and Girls (n = 204)

Predictor(s)	Criterion	Weights				Constant (a)	F
		b_1	b_2	b_3	b_4		
CP, MRT, VDII	Word Reading	.70	.21	-.20		.94	77.68**
CP, VDII, LC, C	Paragraph Meaning	.66	-.25	.29	-.13	-.39	55.96**
MRT, VDII, LC, VDI	Vocabulary	.54	-.26	.34	-.12	6.05	36.07**
CP, MRT, VDII	Word Study	.63	.32	-.24		7.58	82.24**
CP, MRT, VDII, LC	Total Reading	.59	.30	-.28	.15	2.10	93.47**
MRT, CP, VDII, CB	Arithmetic	.42	.38	-.28	.16	22.92	48.26**
CP, MRT, VDII, LC	Total Achievement	.59	.34	-.30	.16	25.93	112.68**

Note: Abbreviations are as follows: CP = Central Processing; MRT = Metropolitan Readiness Test; VDII = Visual Discrimination II; LC = Language and Cognitive Subtest; C = Control; VDI = Visual Discrimination I.

*$p < .05$

**$p < .01$

with the Central Processing and Visual Discrimination II subtests were effective predictors. For the Paragraph Meaning Test the same four subtests which were identified in the first regression analysis as effective predictors, appeared once again as significant predictors. The Metropolitan Test along the Visual Discrimination II, Language and Cognitive, and Visual Discrimination I subtests were significantly correlated with the Vocabulary Test. For the Total Reading and Total Achievement criteria, the Readiness Test along with the Central Processing, Visual Discrimination II, and Language and Cognitive subtests were effective predictors. For the Arithmetic Test, the Metropolitan Readiness Test along with the Central Processing, Visual Discrimination II and Classroom Behaviour subtests were effective predictors. The results of the regression analysis indicate that the Metropolitan Readiness Test contributes to a certain extent to the regression equations for the achievement measures. However the insertion of the Readiness Test in the regression analysis with the Grade One Rating Scale subtests does not increase the multiple correlations with the achievement criteria by an appreciable margin. The multiple correlations (R) obtained as the result of the step-wise procedure are presented in Table 12. When compared to the multiple correlations obtained for the combined sample (See Table 7) it can be seen that both series of multiple correlations do not differ substantially. Five of the multiple correlations calculated with the Metropolitan Test as predictor are slightly greater than the corresponding multiple correlations calculated solely with the subtests of the Grade One Rating Scale. The greatest differences occurred with the multiple correlations for the Vocabulary and Arithmetic Test where differences

Table 12

Multiple Correlations (R) Between Grade One Rating Scale and Metropolitan Readiness Test as Predictors and Achievement Measures as Criterion

Predictors	Criterion	R	F-Ratio
CP, MRT, VDII	Word Reading	.72	28.50**
CP, VDII, LC, C	Paragraph Meaning	.72	28.50**
MRT, VDII, LC, VDI	Vocabulary	.65	20.27**
CP, MRT, VDII	Word Study	.74	32.57**
CPM, MRT, VDII, LC	Total Reading	.80	49.77**
MRT, CP, VDII, CB	Arithmetic	.69	25.87**
CP, MRT, VDII, LC	Total Achievement	.82	56.84**

Note: Abbreviations are as follows: CP = Central Processing; MRT = Metropolitan Readiness Test; VDII = Visual Discrimination II; LC = Language and Cognitive Subtest; C = Control; VDI = Visual Discrmination I.

**$p < .01$

of .10 and .09 were observed. The slightest discrepancy occurred with the Word Reading Test where the difference in multiple correlations was only .01. Two of the multiple correlations calculated solely with the Rating Scale subtests as predictors were greater than those calculated with the Readiness Test. For the Paragraph Meaning Test and Total Reading Achievement the differences in the multiple correlations were .01 and .04 respectively.

Resultant Scale

The final version of the Grade One Rating Scale to emerge as a result of the step-wise regression analysis of the original nine subtests as predictors consists of six 7 subtests and a total of 34 items. Those subtest identified as significant predictors by the multiple regression analysis for the combined sample and for the sample of boys and girls separately were selected for inclusion in the final form of the Grade One Rating Scale. These subtests are as follows: 1) Central Processing 2) Language and Cognitive Subtest 3) Control 4) Visual Discrimination II 5) Auditory Memory and 6) Fine Motor. The final form of the Grade One Rating Scale along with normative data and cutting scores are found in Appendix F. Guidelines for the use of the scale are also offered in Chapter 5.

CHAPTER V

Discussion

The present study has focused on the use of teacher ratings in the early identification of children with learning difficulties and on the construction of a rating scale specifically for the purpose of identification. The major intent was to devise a rating scale measuring those aspects of a child's behaviour which were considered predictive of school achievement. In addition it was the investigator's purpose to demonstrate the predictive efficiency of teacher's ratings using this scale.

The data from the present study reveals a significant relationship between teacher ratings using the Grade One Rating Scale and the various achievement measures. The scale which emerged as a result of the factor analysis and regression procedures consists of nine subtests, six of which were identified as predictors of the achievement criteria.

The discussion to follow is divided into five major sections. The first part is devoted to a discussion of the results of the study and the conclusions derived from these results. The second deals with the limitations of the present study. The various delimitations of the present investigation are discussed in the third section. The fourth part deals with an integration of the significance and implications of the findings. The fifth and concluding section offers suggestions for further research as well as recommendations for further use of the Grade One Rating Scale.

Conclusions and Discussion

The major conclusion reached as a result of the present study is that teacher's ratings of their pupils on specific behavioural dimensions are predictive of achievement criteria. The multiple correlations for six of the seven criteria achieved statistical significance at the .01 level. The remaining multiple correlation was significant at the .05 level.

Additional evidence for the predictive efficiency of teacher ratings was demonstrated by the significant correlations between the behavioural ratings and teacher ranked groupings of his pupils. For the total sample, the correlation between the Grade One Rating Scale total score and teacher ranked groups was .82; for boys r = .76; for girls 4 = .87.

Further predictive validity for teacher ratings became evident when the multiple correlations between the subtests and criteria were compared to the correlations between the Metropolitan Readiness Test and criteria. Sixteen (16) out of twenty-one (21) multiple correlations were larger than the corresponding product moment coefficients. The lower correlation coefficients between the Metropolitan Test and criterion measures were expected because of the longer time interval (8 months vs 4 months) between the administration of the Readiness Test and criterion measures and between completion of the ratings and criterion measures. Nevertheless, the large multiple correlations obtained with the use of a multi-dimensional instrument such as the Grade One Rating Scale must be considered more effective than the prediction obtained with only one variable. The total score of the Metropolitan Test was used as the sole predictor because of its extensive use as a measure of the Grade One pupils readiness status. Subtest scores are not usually employed by Grade One teachers for diagnostic purposes. For this reason the subtest scores were not used as predictor variables.

Additional validity for teacher ratings was shown by the insertion of the Metropolitan Readiness Test in the regression analysis along with the subtests of the Grade One Rating Scale. The Metropolitan Test appeared as a significant predictor in the regression equations for six of the seven criteria. However the addition of the Readiness Test did not result in any appreciable increase in the multiple correlations with the achievement criteria.

With regard to the specific behaviour dimensions identified by the regression analysis as being predictive of the achievement measures, six of the nine subtests appeared in the regression equations for the various criteria. For the combined sample of boys and girls, a combination of four subtests were significantly correlated with the criteria. The Central Processing, Visual Discrimination II, Language and Cognitive, and Control subtests were identified as effective predictors for Total Reading and Total Achievement. Three of these subtests with the exception of the Control subtest were significantly correlated with the Arithmetic Test.

The behavioural dimensions measured by these four subtests are similar to various correlates identified elsewhere as involved in reading and arithmetic ability, (Dechant, 1970; Otto, McMenemy and Smith, 1973). The specific visual and auditory skills measured by the Central Processing subtest have been identified by Dechant (1970) as having a strong relationship with mastery of the reading task. Furthermore, conceptual thought and mastery of spoken language which are both measured by the Language and Cognitive subtest have shown to be related to successful beginning reading (Dechant, 1970; Otto et. al., 1973). In regard to arithmetic, Otto et. al. (1973) state that the same perceptual and cognitive factors that influence reading ability in general affect learning in the specific area of arithmetic. Thus, the similarity in predictors for both reading and arithmetic was somewhat expected.

With regard to the predictors for boys and girls separately, additional subtests were identified as significant. For boys, the Auditory Memory subtest was included in the regression equation; for girls, the Fine Motor subtest appeared as a significant predictor. Both of these specific areas of the child's functioning have been considered as important in reading ability. Dechant (1970) states that auditory memory is essential in the reading process since it allows the child to associate with the written word, the meaning that has been associated with the spoken word. Otto et. al. suggest that perceptuo-motor factors as measured by the Fine-Motor subtest is an important correlate of a reading disability.

An interesting finding to emerge from the step-wise regression procedures was the absence of the Language and Cognitive subtest in the regression equations for girls. As mentioned earlier, one of the reasons for the notable absence of this subtest was the small degree of variability in scores for girls on this dimension. Another reason lies in the high correlation between the Language and Cognitive subtest and the Central Processing subtest. The step-wise regression procedure attempts to identify independent variables which show a high correlation with the criterion and a low correlation with each other. Since the correlation between the Central Processing and Language and Cognitive subtests was relatively high (r = .82) the inclusion of both instead of either one or the other, would contribute little to the prediction achieved. For this reason only the Central Processing subtest was identified as a significant predictor in the regression equation. At first glance, the absence of the Language and Cognitive subtest as a predictor would imply a sex difference in terms of the various dimensions used for prediction. However, such was not the case.

Nevertheless a sex difference was noted in the teacher ratings. The findings reveal that girls tended to be rated higher than boys on all subtests. One possible reason for this is the traditional perception by teachers of boys as having greater difficulty in the areas of functioning measured by the rating scale. The perceptions by teachers could have resulted in a halo effect (Guilford, 1956) which is defined as the tendency to rate persons in terms of a general mental attitude toward them.

An analysis of the six subtests which were predictive of the achievement criteria in terms of the information processing model reveals an interesting pattern. Four of the six subtests, i.e. Central Processing, Visual Discrimination II, Control and Auditory Memory are categorized in the Central Processing section of the model. Only one subtest, the Fine Motor subtest, is categorized as an output dimension. The remaining subtest, the Language and Cognitive subtest, measures both cognitive processes and the output dimension of spoken Language. In summary, the majority of predictors measure Central

Processing functions. This conclusion is substantiated by Sabatino (1968) who found that those information processing behaviours which best described a specific learning disability were of the auditory-visual integrative type. In addition, he found that memory and integration abilities were included in these auditory-visual integrative kinds of behaviours. These dimensions have a high degree of correspondence with the central processing functions outlined in the integrated information model.

The six subtests in the final version of the Grade One Rating Scale are ones found in other studies as having concurrent or predictive validity in relation to school achievement. Nelson, Boyd, Maguire, Malone, Ryan and Scott (1975) found that items dealing with speech and vocabulary, comprehension, difficulty with pen or pencil, restlessness and abnormal behaviours were key questions for inclusion in a teacher questionnaire. These categories correspond to the following subtests of the Grade One Rating Scale: 1) Language and Cognitive Subtest 2) Fine Motor and 3) Control. Furthermore the Fine Motor, Control and Language and Cognitive Subtests correspond to the Drawing/Writing, Hyperactive-Aggressive and Conceptualization Factors of the Classroom Screening Instrument (Beatty, 1975).

The six subtests which were found predictive of the achievement criteria also correspond to several of the subtests included in the Adelman and Feshbach and Myklebust instruments. The kindergarten scale of the Adelman and Feshbach series is the only scale which has undergone statistical analysis. This scale consists of five factors which are similar to those factors of the Grade One Rating Scale. The Recall and Perceptual Motor factors correspond to the Auditory Memory and Fine Motor subtests of the Grade One Scale; the Perceptual Discrimination and Impulse Control factors are similar to the Visual Discrimination II and Control subtests while the fifth factor, Language Development contains items found in the Language and Cognitive subtest of the Grade One Rating Scale. In regard to the Myklebust Pupil Rating Scale, the Auditory Comprehension and Spoken Language factors correspond to the Langauge and Cognitive subtest while the Motor Coordination factor is similar to the Fine Motor subtest of the Grade One Scale.

Limitations

One of the major limitations of the study pertains to the various errors involved in ratings. One of the common errors which occur in ratings and which was evident in the present study is the error of central tendency. Guilford (1956) defines this type of error as the general tendency of the rater to avoid extreme judgements and rate down the middle of the rating scale. One method to counteract this error is the introduction of greater meanings in differences between steps near the ends of the scale than between steps near the centre (Guilford 1956). Nunnally (1968) recommends that an even number of steps be used on rating scales as one precaution to reduce this error of central tendency. Therefore, in any revisions of the Grade One Rating Scale it is recommended that careful consideration be given to these suggestions.

A second limitation deals with the lack of inter-rater reliability measures for teacher ratings. However, it was impossible to obtain inter-rater measures because of the single teacher per classroom situations. For further cross validation purposes, attempts should be made to use team teaching settings were inter-rater reliability measures can be more easily obtained.

Delimitations

One major delimitation pertains to the use of the grade one setting in the present study. Ideally, the kindergarten setting would have been the more appropriate educational setting to carry out this investigation. However, because of the focus of the present study on classroom functioning and the recency of the implementation of kindergarten programmes in the Province of Alberta at the time of the study, it seemed much more feasible to carry out the investigation in the more established grade one settings. It was the author's opinion that the diversity and lack of consistency in the kindergarten programmes would result in certain difficulties. Major difficulties would arise in the selection of common items for the original Grade One Rating Scale. Perhaps in the future years, after the kindergarten curriculum has been well established, an early identification study using kindergarten teacher's ratings could be implemented.

Another delimitation concerns the amount of time lapse between completion of the ratings by teachers and the administration of the criterion measures. A deliberate attempt was made to incorporate the suggestions made by Keogh (1974) pertaining to the need for short term predictive studies. Thus ratings were carried out in the winter term of the school year. However, consideration should be given to the completion of ratings by teachers in the fall rather than in January and February. This would allow more time for remedial work. Future validation studies might focus on the completion of ratings in the first term of the school year.

The last delimitation pertains to the content of the Grade One Rating Scale. It is obvious that not all of the information processing categories presented in Figure 1 were included in the Grade One Rating Scale. Since the Pupil Rating Scale and the Student Rating Scale formed the basis for the resultant rating scale it was not possible to use the information processing model in the construction of the scale. Further additions to the scale should include those items measuring those information processing behaviours not presently contained in the scale. More specifically, items measuring those Cognitive processes delineated in the information processing model should be included in further additions to the scale.

Significance and Implications

It may be concluded from this study that teacher ratings on specific behavioural dimensions are highly predictive of a pupil's achievement in various academic areas. The implication of this finding is that teachers represent a useful first level screen in the identification of educationally high risk children. Furthermore, it is now evident that teachers may well be used more actively and systematically in the early identification process.

The process of early identification has been discussed in the literature as consisting of two major parts (Wissink, Kass and Ferrell, 1975). The first is the screening to determine possible need for remedial help and the second is the clinical diagnosis for confirmation and prescription of the programme best suited to the individual child. Clinical diagnosis is properly done by specialists, but the preliminary screening, as the present study has shown, can be done by classroom teachers. The grade one teacher's day to day experience with a variety of behaviours gives her an unequalled perspective for appraising classroom functioning. The teacher's perspective is enhanced even more if she is given an observation guide such as a rating scale. This is demonstrated quite clearly in the study by the difference in the multiple correlations (R) between the rating scale subtests and criteria and the Pearson product moment coefficients (r) between teacher ranked groups and the criterion measures. For the combined sample the multiple correlation for Total Reading was .84 while the Pearson correlation was .70; for Total Achievement R = .80 while r = .70. For boys only, the multiple correlation for Total Reading was .77 and the Pearson correlation was .73: for Total Achievement, R = .78 and r = .73. For girls only, the multiple correlation for Total Reading was .78 while the Pearson correlation was .65; for Total Achievement, R = .81 and the Pearson correlation was .67. Thus, it is evident that the teacher, equipped with a rating scale, is now able to participate more fully in the diagnostic remedial process.

The usefulness of the Grade One Rating Scale as an aid to observation and diagnosis became even more apparent during the course of the present study. The reaction of the twenty-four teachers to the rating scale was extremely positive. All of the teachers felt that the rating scale was helpful in making them more aware of relevant educationally behaviours. Comments by the teachers such as "I know now where the kids are having problems and "I thought that I knew the kids well but I didn't"were common. Another indicator of the usefulness of the rating scale was the request by each teacher for a copy of the final version of the Grade One Rating Scale. All the teachers planned to use the rating scale in the next school year. The last but perhaps one of the most important indicators of the value of the rating scale was the direction it provided teachers for the planning of information remedical programmes. It has already been mentioned above that many of the teachers reported they had become more aware of each pupil's strengths and weaknesses after completing the ratings. Most teachers went on to report a desire to initiate an individual remedial programme for the particular children whom they felt were experiencing difficulties in the areas measured by the rating scale.

Further Research

Several suggestions for further research have already been presented in this chapter. These suggestions can be summarized as follows:

a) Revisions to the Grade One Rating Scale should include attempts to reduce the error of central tendency in ratings.

b) Inter-rater reliability measures should be obtained for teacher ratings.

c) A predictive study using teacher ratings in a kindergarten setting could be implemented.

d) Consideration should be given to the completion of ratings by teachers in the fall rather than the winter of the academic year.

e) Additional information processing behaviours should be included in future revisions of the Grade One Rating Scale.

In addition to the above recommendations, further research must be done in order to establish further validity and reliability measures for the Grade One Rating Scale.

In regard to validity, the findings reveal that the R obtained in the cross validation sample are reasonably close to the R corrected for shrinkage in the normative sample. This confirms the predictive validity of teacher ratings using the Grade One Rating Scale. Nevertheless, construct and concurrent validity of the rating scale must be demonstrated before the instrument can be used for diagnostic purposes. Construct validity is defined as the extent to which a test may be said to measure a theoretical construct or trait (Anatasi, 1968). Construct validity for the Grade One Rating Scale can be demonstrated by the use of the convergent and discriminant validation procedures outlined by Campbell and Fiske (1959). Concurrent validity refers to the relevance of a test for diagnosis of existing status rather than predictions of future outcomes. Concurrent validity for the Grade One Rating Scale can be demonstrated by the degree with which the nine subtests correlate with outside and independent measures of the same areas measured by the subtests. Psychological instruments such as the Illinois Test of Psycholinguistic Abilities and the Wechsler Intelligence Scale for Children may be used in the validation procedures.

In regard to reliability it has been demonstrated that the nine subtests of the Rating Scale possess a moderate degree of internal consistency. The somewhat moderate to low coefficients are due to the small number of items in each subtest. Guilford (1956) suggests that the addition of items will result in an increase in internal consistency. However, while internal consistency is an important prerequisite for any instrument, there are two additional forms of reliability which are important. The first is referred to as test-retrest reliability (Guilford 1956) and can be achieved by obtaining ratings by the same teacher on the same students at different time intervals. The second type of reliability which is defined as the agreement of ratings on the same subject by different raters is called inter-rater reliability. The need for inter-rater reliability has already been discussed above. Guilford (1956) suggests that this form of reliability is superior to the re-rating method because of smaller errors involved in inter-ratings. Because of the nature of the Grade One Rating Scale and its proposed use as a diagnostic and screening instrument these two forms of reliability must be achieved in further work with the Rating Scale.

Use of the Grade One Rating Scale

The Grade One Rating Scale to emerge as a result of the present study consists of six subtests and a total of 34 items (see Appendix F). The subtests included in the scale are those six of the nine subtests from the preliminary version of the scale to be identified as significant predictors by the regression analysis. The preliminary verion of the scale which was used in the study consisted of nine subtests and fifty-two items (see Appendix E).

Even though the Grade One Rating Scale can now be used by classroom teachers, several considerations should be kept in mind. Firstly, the teacher's ratings on those subtests not identified as as significant predictors may have influenced teacher's ratings on the predictive subtests. Therefore it is recommended that the larger preliminary form (Appendix E) of the Grade One Rating Scale be used by classroom teachers. However, it is suggested that the 34 item final form of the scale be used in further validation studies.

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APPENDIX A

The Student Rating Scale

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A 1

PREDICTION & PREVENTION PROJECT
UCLA PSYCHOLOGY DEPARTMENT
405 HILGARD AVENUE
LOS ANGELES, CALIFORNIA 90024

TEACHER______________________________________

SCHOOL__________________________ ROOM________

FIRST GRADE
STUDENT RATING SCALE

This scale is designed to measure a first grade child's performance on certain classroom behaviors and skills. You are asked to observe each student for the next six to eight weeks in terms of these behaviors and skills, and at the end of that period, rate his performance on each item.

RATING INSTRUCTIONS:

1. LOOK OVER THE SCALE (read each item) AS SOON AS POSSIBLE.
2. DON'T FILL OUT THE SCALE ITEMS UNTIL AFTER YOU HAVE OBSERVED THE CHILDREN FOR AT LEAST SIX WEEKS. Consider only what the child did during that time period, try to disregard previous behavior, and try to have your response reflect the sum total of your impressions for the entire observation period.
3. CONSIDER EACH QUESTION INDEPENDENTLY, even though a child may show seemingly contradictory behavior.
4. BASE YOUR RATINGS ON YOUR OBSERVATIONS OF THE CHILD'S ACTUAL FUNCTIONING IN THE CLASSROOM.
5. ANSWER EVERY ITEM -- do not leave blanks, please.
6. USE EXTREME RATING (1 or 5) WHERE APPROPRIATE.

You will have the opportunity to meet with our staff to clarify the instructions, items and procedures before you begin the ratings.

There may be items which refer to skills and behaviors which you would not normally have an opportunity to observe. In such cases, we are suggesting that teachers plan and implement special class activities which will elicit such skills and behaviors. If it would be helpful to you, we would be happy to aid in the planning of such special activities. Please feel free to call on us if you wish such assistance.

Please do not consult with anyone about the accuracy of your ratings. We are interested in responses which are based on your own knowledge of and experience with the child.

Note the label at the top of each page. This is a research scale and is still in the process of modification based on our findings and your suggestions, so feel free to suggest changes as you see the need. (A special "Comments" sheet is enclosed for this purpose.) However, please respond to each item to the best of your ability.

Finally, these records are for research use only, and are kept strictly confidential, to protect both your privacy and the privacy of the children in your class.

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B1

PREDICTION & PREVENTION PROJECT
UCLA PSYCHOLOGY DEPARTMENT
405 HILGARD AVENUE
LOS ANGELES, CALIFORNIA 90024

FIRST GRADE
STUDENT RATING SCALE

RATINGS. In rating each child on these behavior and skill items you will be showing how much of the time the child performs each behavior or skill in an adequate manner. "Adequate" ("appropriate" or "effective") performance is performance you would grade "C" or better if you were grading it. Stated differently, a level of functioning which is not adequate is a level which would handicap a youngster in his efforts to learn to read. *

A five-point scale is used. The following statements are intended to give a frame of reference or criterion for each point on the scale:

1. -- the lowest rating -- a rating of "1" shows that the student's performance is NEVER OR HARDLY EVER (10% or less of the time) adequate, appropriate or effective in situations requiring this specific behavior or skill.

2. -- the next-to-lowest rating-- a rating of "2" indicates that the student's performance is SOMETIMES (10% to 40% of the time) adequate, appropriate or effective in situations requiring the specific behavior or skill.

3. -- the middle rating -- a rating of "3" shows that the student's performance is adequate, appropriate or effective ABOUT HALF THE TIME (40% to 60% of the time) in situations requiring the specific behavior or skill.

4. --the next-to-highest rating-- a rating of "4" indicates that in situations requiring the specific behavior or skill, the student's performance is USUALLY (60% to 90% of the time) adequate, appropriate or effective.

5. -- the highest rating-- a rating of "5" indicates that in situations requiring the behavior or skill, the child's performance is adequate, appropriate or effective ALMOST ALL OF THE TIME (90 to 100% of the time).

EXAMPLE. (See attached sample answer sheet)

On the sample answer sheet, Billy A. has been observed to speak clearly (Item #1) ALMOST ALL OF THE TIME during the six to eight week observation period, so the box for Item #1 is marked "5" under Billy's name. Sally B., however, has been observed to speak clearly only 10 to 40% of the time (SOMETIMES), so the box for Item #1 under her name is marked "2".

* EXCEPTION: The last five items (A through E) represent key social behaviors that might interfere with a child's successful classroom performance. Each item is rated on a 1 to 5 scale, according to its frequency of occurrence. Since these are not competencies or skills in the usual sense, however, please indicate simply how frequently each child shows the interfering behavior in class.

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E1

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RATING CRITERIA

1	2	3	4	5
never or hardly ever	some-times	about half the time	usually	almost all of the time or always

1. When a classroom task or activity requires it, how often does he speak clearly enough to be understood by you? 1

2. When a classroom task or activity requires it, how often is his vocabulary adequate to express his own ideas or accomplish a task? 2

3. When a classroom task or activity requires it, how often does he do more than merely name objects when attempting to verbalize ideas, thoughts and feelings? 3

4. When . . . required, how often does he use at least simple sentences to express himself? 4

5. When . . . required, how often does he label the important objects seen in a picture? 5

6. When . . . required, how often does he relate the main ideas represented in the picture, i.e., tell the story portrayed in a picture in simple terms? 6

7. . . . how often does he understand what is said in class by you and by other students, e.g., directions, explanations, answers, stories, etc.? 7

8. . . . how often does he show an interest in looking at books? 8

9. . . . how often does he realize that words which can be said also can be written down or found in books? 9

10. . . . how often have you observed that he can answer questions about the content of at least a simple story that has been read to him? 10

11. . . . how often does he visually discriminate the differences and similarities in words and/or letters, e.g., b & d, was & saw, horse & house, etc.? 11

12. . . . how often does he listen and auditorily discriminate the differences and similarities in letter names, e.g., b & p, d & t, f & v, etc.? 12

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F1

PREDICTION & PREVENTION PROJECT
UCLA PSYCHOLOGY DEPARTMENT
405 HILGARD AVENUE
LOS ANGELES, CALIFORNIA 90024

RATING CRITERIA

1	2	3	4	5
never or hardly ever	some-times	about half the time	usually	almost all of the time or always

⑬ When a classroom task or activity requires it, how often does he listen and auditorily discriminate the differences and similarities in consonant letter sounds, e.g., f & v, b & d, etc.? ⑬

14. When a classroom task or activity requires it, how often does he listen and auditorily discriminate the differences and similarities in vowel letter sounds, e.g., ā & ă, ĕ & ĭ, etc.? 14

15. When . . . required, how often does he listen and auditorily discriminate the differences and similarities in words, e.g., mat & met, bat & pat, etc.? 15

16. When . . . required, how often have you observed that he can copy a simple sentence correctly? 16

17. . . .how often does he see that separate letters put together make a word and that words are made up of separate letters, i.e., see the relationship of a part to the whole? 17

18. . . .how often does he recall what was presented earlier that day in order to do his work, e.g., ideas, explanations, printed words and letters, etc.? 18

19. . . .how often does he recall what was presented the day before in order to do his work, e.g., ideas, explanations, printed words and letters, etc.? 19

20. . . .how often have you observed that he can repeat back what he has just been told? 20

21. . . .how often does he listen attentively? 21

22. . . .how often does he attend to a picture, word, or letter displayed to the class (group)? 22

23. . . .how often does he follow simple directions which have been given to the class as a whole? 23

24. . . .how often does he follow simple directions which have been explained individually? 24

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G

PREDICTION & PREVENTION PROJECT
UCLA PSYCHOLOGY DEPARTMENT
405 HILGARD AVENUE
LOS ANGELES, CALIFORNIA 90024

RATING CRITERIA

1	2	3	4	5
never or hardly ever	some-times	about half the time	usually	almost all of the time or always

㉕ When a classroom task or activity requires it, how often does he maintain attention for sufficient periods of time in doing seat work to complete at least a simple classroom task when working alone? ㉕

26. When a classroom task or activity requires it, how often does he maintain attention for sufficient periods of time in doing seat work to complete at least a simple classroom task when the class is being instructed as a whole? 26

27. When . . . required, how often does he work without constant supervision and reminders, e.g., complete a task without needing frequent support, etc.? 27

28. When . . . required, how often have you observed that he can set aside an assigned task he is doing in order to begin another one? 28

29. . . . how often have you observed that he can set aside an assigned task he is doing and return to finish it later on? 29

30. . . . how often does he shift activities effectively with the rest of the class after completing a task? 30

31. . . . how often does he stick to a task he finds difficult, e.g., does not give up easily on a difficult task or one which he may find frustrating, etc.? 31

32. . . . how often does he carry on with a task or activity which requires several days to accomplish, e.g., a special project such as making an alphabet book, work book activities, etc.? 32

33. . . . how often does he solve simple problems by himself -- such as finding needed materials, figuring out what to do after completing a task? 33

34. . . . how often does he follow rules without too much testing of the limits? 34

35. . . . how often does he ask for adult help when necessary? 35

36. . . . how often does he work effectively with peers? 36

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H

PREDICTION & PREVENTION PROJECT
UCLA PSYCHOLOGY DEPARTMENT
405 HILGARD AVENUE
LOS ANGELES, CALIFORNIA 90024

RATING CRITERIA

1	2	3	4	5
never or hardly ever	some-times	about half the time	usually	almost all of the time or always

(37) When a classroom task or activity requires it, how often does he perform a task without being distracted. (37)

38. When a classroom task or activity requires it, how often does he accept adult direction without becoming distracted or irritated. 38

39. When . . . required, how often can he produce the phonetic sound of the letters that he sees printed? 39

40. When . . . required, how often have you observed that he can reproduce the sounds of letters that he hears? 40

41. . . . how often have you observed that he can correctly write letters that represent phonetic sounds he hears? 41

42. . . . how often does he use correct left to right, top to bottom progression in reading or writing, i.e., directionality? 42

43. . . . how often does his reading performance reflect that he understands the meaning of punctuation marks, e.g., periods, quotation marks, question marks, etc.? 43

A. In class, how often is he argumentative with adults or his peers? A

B. In class, how often does he appear withdrawn or isolated in dealing with adults or his peers? B

C. In class, how often does he excessively seek adult attention and support. C

D. In class, how often does he interrupt the teacher or his peers? D

E. In class, how often does he fight with others? E

APPENDIX B

The Pupil Rating Scale

THE PUPIL RATING SCALE

Screening for Learning Disabilities

HELMER R. MYKLEBUST, Ed.D.
Department of Special Education, Northern Illinois University

*PUPIL'S NAME*________________ *SEX*____ *DATE*__________ *Year Month Day*

*RESIDENCE*____________________ *BORN*__________ *Year Month Day*

*PARENTS*____________________ *AGE*__________ *Years Months Days*

*SCHOOL*____________________

*TEACHER*____________________ *GRADE*__________

SUMMARY OF SCORES

AUDITORY COMPREHENSION	____		
SPOKEN LANGUAGE	____	*VERBAL SCORE*	____
ORIENTATION	____		
MOTOR COORDINATION	____		
PERSONAL-SOCIAL BEHAVIOR	____	*NONVERBAL SCORE*	____
		TOTAL SCALE SCORE	____

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TO THE TEACHER

Some children have deficits in learning which distinguish them from others in their class. The Pupil Rating Scale was developed so that these children can be effectively identified.

Your are to rate each child in five *behavioral areas,* all of which are related to success in learning: *Auditory Comprehension, Spoken Language, Orientation, Motor Coordination,* and *Personal-Social Behavior.* The ratings are made on a five-point scale. A rating of 3 is average, ratings of 1 or 2 are below average, and ratings of 4 or 5 are above average. A rating of 1 is the lowest and a rating of 5 is the highest that can be given. Indicate your rating by circling the number that represents your judgment of the child's level of function. When making your evaluation, rate only one area of behavior at a time and bear in mind that a child may be learning well in some respects but not in others.

The purpose of the Pupil Rating Scale is to identify those children who have learning disabilities. It should not be used as an indicator of inferior potential nor of lack of opportunity to learn. It is important, therefore, that your ratings be made only on the basis of the items listed on the Scale.

Other precautions are that you have extensive opportunity for observing the child and that you carefully study the Manual before you make your ratings.

Behavioral Characteristics

AUDITORY COMPREHENSION

	RATING
COMPREHENDING WORD MEANINGS	
Extremely immature level of understanding	1
Fails to grasp simple word meanings; misunderstands words at grade level	2
Good grasp of vocabulary for age and grade	3
Understands all grade-level vocabulary as well as higher-level word meanings	4
Superior understanding of vocabulary; understands many abstract words	5
FOLLOWING INSTRUCTIONS	
Unable to follow instructions; always confused	1
Usually follows simple instructions but often needs individual help	2
Follows instructions that are familiar and not complex	3
Remembers and follows extended instructions	4
Unusually skillful in remembering and following instructions	5
COMPREHENDING CLASS DISCUSSIONS	
Unable to follow and understand class discussions; always inattentive	1
Listens but rarely understands well; mind often wanders	2
Listens and follows discussions according to age and grade	3
Understands well; benefits from discussions	4
Becomes involved; shows unusual understanding of material	5
RETAINING INFORMATION	
Almost total lack of recall; poor memory	1
Retains simple ideas and procedures if repeated	2
Average retention of materials; adequate memory for age and grade	3
Remembers information from various sources; good immediate and delayed recall	4
Superior memory for details and content	5

SCORE ________

SPOKEN LANGUAGE

	RATING
VOCABULARY	
Always uses immature, poor vocabulary	1
Limited vocabulary, primarily simple nouns; few precise, descriptive words	2
Adequate vocabulary for age and grade	3
Above average vocabulary; uses numerous precise, descriptive words	4
High-level vocabulary; always uses precise words; conveys abstractions	5
GRAMMAR	
Always uses incomplete sentences with grammatical errors	1
Frequently uses incomplete sentences; numerous grammatical errors	2
Uses correct grammar; few errors in use of prepositions, verb tense, pronouns	3
Above average oral language; rarely makes grammatical errors	4
Always speaks in grammatically correct sentences	5
WORD RECALL	
Unable to recall the exact word	1
Often gropes for words to express himself	2
Occasionally searches for correct word; recall adequate for age and grade	3
Above average; rarely hesitates on a word	4
Always speaks well; never hesitates or substitutes	5
STORYTELLING—RELATING EXPERIENCES	
Unable to tell a comprehensible story	1
Difficulty relating ideas in a logical sequence	2
Average; adequate for age and grade	3
Above average; uses logical sequence	4
Exceptional; relates ideas in a logical, meaningful manner	5
FORMULATING IDEAS	
Unable to relate isolated facts	1
Difficulty relating isolated facts; incomplete and scattered ideas	2
Usually relates facts meaningfully; relates facts adequately for age and grade	3
Above average; relates facts and ideas well	4
Outstanding; always relates facts appropriately	5

SCORE ______

ORIENTATION

	RATING
JUDGING TIME	
Lacks grasp of meaning of time; always late or confused	1
Fair time concept; tends to dawdle; often late	2
Average time judgment; adequate for age and grade	3
Prompt; late only with good reason	4
Skillful in handling schedules; plans and organizes well	5
SPATIAL ORIENTATION	
Always confused; unable to navigate around school, playground, or neighborhood	1
Frequently gets lost in relatively familiar surroundings	2
Can maneuver in familiar locations; average ability for age and grade	3
Above average; rarely lost or confused	4
Adapts to new situations and locations; never lost	5
JUDGING RELATIONSHIPS (big-little, far-close, heavy-light)	
Judgments always inadequate	1
Makes elementary judgments successfully	2
Average judgments for age and grade	3
Accurate but does not generalize to new situations	4
Unusually precise judgments; generalizes to new situations and experiences	5
KNOWING DIRECTIONS	
Highly confused; unable to distinguish right-left, north-south-east-west	1
Sometimes exhibits confusion	2
Average; uses right-left, north-south-east-west	3
Good sense of direction; seldom confused	4
Excellent sense of direction	5

SCORE ______

MOTOR COORDINATION

GENERAL COORDINATION (walking, running, hopping, climbing)	
Very poorly coordinated; clumsy	1
Below average; awkward	2
Average for age; graceful	3
Above average; does well in motor activities	4
Excels in coordination	5
BALANCE	
Very poor balance	1
Below-average ability; falls frequently	2
Average ability for age; adequate equilibrium	3
Above average ability in activities requiring balance	4
Excels in balance	5
MANUAL DEXTERITY	
Very poor in manual dexterity	1
Awkward; below average in dexterity	2
Adequate dexterity for age; manipulates well	3
Above-average dexterity	4
Excels; readily manipulates new equipment	5

SCORE ______

PERSONAL-SOCIAL BEHAVIOR

	RATING
COOPERATION	
Continually disrupts classroom; unable to inhibit responses	1
Frequently demands attention; often speaks out of turn	2
Waits his turn; average for age and grade	3
Above average; cooperates well	4
Excellent ability; cooperates without adult encouragement	5
ATTENTION	
Never attentive: very distractible	1
Rarely listens; attention frequently wanders	2
Attention adequate for age and grade	3
Above average in attention; almost always attends	4
Always attends to important aspects; long attention span	5
ORGANIZATION	
Highly disorganized; very slovenly	1
Often disorganized in manner of working; inexact, careless	2
Maintains average organization of work; careful	3
Above-average organization; organizes and completes work	4
Highly organized; completes assignments in meticulous manner	5
NEW SITUATIONS (parties, trips, changes in routine)	
Becomes extremely excitable, totally lacking in self-control	1
Often overreacts; finds new situations disturbing	2
Adapts adequately for age and grade	3
Adapts easily and quickly with self-confidence	4
Excellent adaptation; shows initiative and independence	5
SOCIAL ACCEPTANCE	
Avoided by others	1
Tolerated by others	2
Liked by others; average for age and grade	3
Well liked by others	4
Sought by others	5
RESPONSIBILITY	
Rejects responsibility; never initiates activities	1
Avoids responsibility; limited acceptance of role for age	2
Accepts responsibility; adequate for age and grade	3
Above average in responsibility; enjoys responsibility; initiates and volunteers	4
Seeks responsibility; almost always takes initiative with enthusiasm	5
COMPLETION OF ASSIGNMENTS	
Never finishes even with guidance	1
Seldom finishes even with guidance	2
Average performance; follows through on assignments	3
Above-average performance; completes assignments without urging	4
Always completes assignments without supervision	5
TACTFULNESS	
Always rude	1
Usually disregards feelings of others	2
Average tact; behavior occasionally inappropriate socially	3
Above average in tactfulness; behavior rarely inappropriate socially	4
Always tactful; behavior never socially inappropriate	5

SCORE ______

APPENDIX C

Supplementary Items

Supplementary Items for SRS

1. When ... required, how often have you observed that he can reproduce or arrange letters or shapes in the same sequence as presented visually?
2. When ... required how often have you observed that he can repeat digits, letters or words in the same sequence as presented verbally?
3. When ... required how often does he repeat series of words, phrases or a sentence given verbally?
4. When a classroom activity or task requires it, how often does he remember sight words after practice and drill?
5. When ... required how often does he place a story in correct sequence when presented visually on a series of cards?
6. When ... required how often does he remember songs and rhymes which have been learned by the class?
7. When ... required how often have you observed that he can write the numbers from 1 to 20?
8. When ... required how often have you observed that he can reproduce bead patterns or peg board patterns?
9. When ... required how often does he reproduce letters, words or shapes presented in a sequence with a Flash-X?
10. When ... required how often have you observed that he can repeat rhythmic patterns?
11. When ... required how often have you observed that he can tell a story in sequence?
12. When ... required how often does he remember and say number facts?
13. When ... required how often have you observed that he can repeat the alphabet in order?
14. When ... required how often does he write letters and words after class drill?

15. When ... required how often have you observed that he matches colours correctly?

16. When ... required how often have you observed that he matches objects correctly?

17. When ... required how often does he match letters and numbers correctly?

18. When ... required how often does he match geometric designs correctly?

19. When ... required how often does he perceive missing parts of pictures or puzzles?

20. When ... required how often does he locate hidden figures?

21. When ... required how often have you observed that he traces around an object or picture?

22. When ... required how often is he able to blend sounds?

23. When ... required how often does he identify numbers correctly?

24. When ... required how often have you observed that he can match sounds?

25. When ... required how often have you observed that he is disturbed by sounds?

---

26. When ... required how often does he contribute to oral discussion in class?

27. When ... required how often does he tell a story?

28. When ... required how often does he use the telephone or tape recorder?

29. When ... required how often does he participate in show and tell activities?

30. When ... required how often have you observed that he can identify incongruities in stories?

31. When ... required how often does he understand what he hears?

32. When ... required how often have you observed that he can follow directions?

33. When ... required how often have you observed that he can follow a conversation?

34. When ... required how often does he tell a story from a picture?

---

35. When ... required how often have you observed that he can print within the lines of his workbook?

36. When ... required how often have you observed that he can cut with scissors?

37. When ... required how often have you observed that he can recognize letters consistently?

38. When ... required how often can he distinguish between left and right?

39. When ... required how often have you observed that he can give you correct answers when a test is given orally but cannot write them on paper?

40. When ... required how often does he place his drawings in the centre rather than in one corner of the page?

41. When ... required how often does he form his letters properly?

42. When ... required how often does he colour pictures without going over the boundaries?

43. When ... required how often have you observed that he can copy from the chalkboard correctly?

44. When ... required how often does he name specific parts of his body?

APPENDIX D

The Student Rating Scale

Resultant Scale

THE STUDENT RATING SCALE

Screening for Learning Difficulties

Department of Educational Psychology

University of Alberta

PUPIL'S NAME ______________________ SEX _____ BIRTH DATE __________________
Year Month Day

SCHOOL ____________________________

TEACHER ___________________________

TO THE TEACHER

The purpose of the Student Rating Scale is to identify those children who have learning difficulties. It should not be used as an indicator of inferior potential nor of lack of opportunity to learn. It is important, therefore, that your ratings be made only on the basis of the items listed on the Scale.

You are to rate each child in various behavioural areas, all of which are related to success in learning. The ratings are made on a five-point scale. A rating of 3 is average, ratings of 1 or 2 are below average, and ratings of 4 or 5 are above average. A rating of 1 is the lowest and a rating of 5 is the highest that can be given. Indicate your rating by circling the number that represents your judgment of the child's level of function. When making your evaluation, rate only one area of behaviour at a time and bear in mind that a child may be learning well in some respects but not in others.

Behavioral Characteristics

AUDITORY COMPREHENSION

		RATING
1.	COMPREHENDING WORD MEANINGS	
	Extremely immature level of understanding	1
	Fails to grasp simple word meanings; misunderstands words at grade level	2
	Good grasp of vocabulary for age and grade	3
	Understands all grade-level vocabulary as well as higher-level word meanings	4
	Superior understanding of vocabulary; understands many abstract words	5
2.	FOLLOWING INSTRUCTIONS	
	Unable to follow instructions; always confused	1
	Usually follows simple instructions but often needs individual help	2
	Follows instructions that are familiar and not complex	3
	Remembers and follows extended instructions	4
	Unusually skillful in remembering and following instructions	5
3.	COMPREHENDING CLASS DISCUSSIONS	
	Unable to follow and understand class discussions; always inattentive	1
	Listens but rarely understands well; mind often wanders	2
	Listens and follows discussions according to age and grade	3
	Understands well; benefits from discussions	4
	Becomes involved; shows unusual understanding of material	5
4.	RETAINING INFORMATION	
	Almost total lack of recall; poor memory	1
	Retains simple ideas and procedures if repeated	2
	Average retention of materials; adequate memory for age and grade	3
	Remembers information from various sources; good immediate and delayed recall	4
	Superior memory for details and content	5
5.	COMPREHENDING STORIES	
	Unable to answer questions about a simple story that has been read by you	1
	Often gives wrong answers to questions about story which you have read	2
	Occasionally gives wrong answers to questions about the story	3
	Above average in understanding the story and answering questions	4
	Exceptional ability in understanding the story and answering questions without error	5

SPOKEN LANGUAGE

		RATING
6.	VOCABULARY	
	Always uses immature, poor vocabulary	1
	Limited vocabulary, primarily simple nouns; few precise, descriptive words	2
	Adequate vocabulary for age and grade	3
	Above-average vocabulary; uses numerous precise, descriptive words	4
	High-level vocabulary; always uses precise words; conveys abstractions	5
7.	GRAMMAR	
	Always uses incomplete sentences with grammatical errors	1
	Frequently uses incomplete sentences; numerous grammatical errors	2
	Uses correct grammar; few errors in use of prepositions, verb tense, pronouns	3
	Above average oral language; rarely makes grammatical errors	4
	Always speaks in grammatically correct sentences	5

SPOKEN LANGUAGE (CONTINUED)

		RATING
8.	WORD RECALL	
	Unable to recall the exact word	1
	Often gropes for words to express himself	2
	Occasionally searches for correct word; recall adequate for age and grade	3
	Above average; rarely hesitates on a word	4
	Always speaks well; never hesitates or substitutes	5
9.	STORYTELLING--RELATING EXPERIENCES	
	Unable to tell a comprehensible story	1
	Difficulty relating ideas in a logical sequence	2
	Average; adequate for age and grade	3
	Above average; uses logical sequence	4
	Exceptional; relates ideas in a logical, meaningful manner	5
10.	FORMULATING IDEAS	
	Unable to relate isolated facts	1
	Difficulty relating isolated facts; incomplete and scattered ideas	2
	Usually relates facts meaningfully; relates facts adequately for age and grade	3
	Above average; relates facts and ideas well	4
	Outstanding; always relates facts appropriately	5
11.	STORYTELLING--PICTURES	
	Great difficulty in telling a story from a picture; merely labels objects	1
	Cannot relate main ideas represented in the picture	2
	Usually is able to tell a story from a picture	3
	Above average ability in telling a story from a picture	4
	Superior ability in relating the main ideas in the picture	5
12.	CLARITY OF SPEECH	
	Speech always unclear; extremely difficult to understand	1
	At times quite difficult to understand speech	2
	Most times easily understood; no difficulty in understanding his speech	3
	Speaks clearly enough to be understood by you	4
	Speech is extremely clear; can be readily understood by you	5

ORIENTATION

13.	JUDGING TIME	
	Lacks grasp of meaning of time; always late or confused	1
	Fair time concept; tends to dawdle; often late	2
	Average time judgment; adequate for age and grade	3
	Prompt; late only with good reason	4
	Skillful in handling schedules; plans and organizes well	5
14.	SPATIAL ORIENTATION	
	Always confused; unable to navigate around school, playground, or neighborhood	1
	Frequently gets lost in relatively familiar surroundings	2
	Can maneuver in familiar locations; average ability for age and grade	3
	Above average; rarely lost or confused	4
	Adapts to new situations and locations; never lost	5

ORIENTATION (CONTINUED)

		RATING
15.	JUDGING RELATIONSHIPS (big-little, far-close, heavy-light)	
	Judgments always inadequate	1
	Makes elementary judgments successfully	2
	Average judgments for age and grade	3
	Accurate but does not generalize to new situations	4
	Unusually precise judgments; generalizes to new situations and experiences	5
16.	KNOWING DIRECTIONS	
	Highly confused; unable to distinguish right-left, north-south-east-west	1
	Sometimes exhibits confusion	2
	Average; uses right-left, north-south-east-west	3
	Good sense of direction; seldom confused	4
	Excellent sense of direction	5

MOTOR COORDINATION

17.	GENERAL COORDINATION (walking, running, hopping, climbing)	
	Very poorly coordinated; clumsy	1
	Below average; awkward	2
	Average for age; graceful	3
	Above average; does well in motor activities	4
	Excels in coordination	5
18.	BALANCE	
	Very poor balance	1
	Below-average ability; falls frequently	2
	Average ability for age; adequate equilibrium	3
	Above average ability in activities requiring balance	4
	Excels in balance	5
19.	MANUAL DEXTERITY	
	Very poor in manual dexterity	1
	Awkward; below average in dexterity	2
	Adequate dexterity for age; manipulates well	3
	Above-average dexterity	4
	Excels; readily manipulates new equipment	5

VISUAL-MOTOR ABILITY

20.	PRINTING	
	Unable to print his letters properly	1
	Has difficulty in printing his letters	2
	Has average ability in printing	3
	Has above average ability in printing	4
	Has superior ability in printing	5
21.	COLOURING	
	Unable to colour pictures without going over boundaries	1
	Has difficulty in keeping within boundaries of a picture he is colouring	2
	Has average ability in colouring	3
	Has above average ability in colouring	4
	Superior ability in colouring	5

VISUAL-MOTOR ABILITY (CONTINUED)

	RATING
22. COPYING	
Has great difficulty in copying a simple sentence correctly	1
Usually cannot copy a sentence from the board correctly	2
Often has difficulty; reverses words in a sentence	3
Sometimes finds it difficult to copy properly	4
Never has difficulty in copying a sentence correctly	5

VISUAL DISCRIMINATION

23. COLOURS	
Unable to match colours correctly	1
Usually has difficulty in matching colours	2
Has average ability in matching colours	3
Sometimes has difficulty in matching colours	4
Never has difficulty in matching colours	5
24. WORDS	
Extreme difficulty in visual discrimination of differences and similarities in words	1
Unable to tell the difference between words like was and saw, horse and house	2
Average ability in differentiating between words	3
Above average ability in telling the difference between words	4
Superior ability; no trouble differentiating between words	5
25. LETTERS	
Unable to match letters correctly	1
Usually has difficulty in matching letters	2
Has average ability in matching letters	3
Sometimes has difficulty in matching letters	4
Never has difficulty in matching letters	5
26. PICTURES	
Unable to perceive missing parts of pictures or puzzles	1
Usually has difficulty in perceiving missing parts of pictures or puzzles	2
Has average ability in perceiving missing parts of pictures or puzzles	3
Sometimes has difficulty in perceiving missing parts of pictures or puzzles	4
Never has difficulty perceiving missing parts of pictures or puzzles	5
27. TRACING	
Unable to trace around an object or picture	1
Usually has difficulty in tracing around an object or picture	2
Has average ability in tracing	3
Sometimes has difficulty in tracing	4
Has superior ability in tracing an object or picture	5

VISUAL MEMORY

28. WORDS AND LETTERS	
Unable to remember sight words after practice and drill	1
Has difficulty in arranging letters in the same sequence as presented by teacher	2
Adequate ability in remembering letters and words presented visually	3
Sometimes has difficulty with sight words	4
Superior ability in remembering sight words	5

VISUAL MEMORY (CONTINUED)

		RATING
29.	NUMBERS	
	Has great difficulty in printing numbers 1 to 20	1
	Usually can print numbers from 1 to 20	2
	Average knowledge of numbers from 1 to 20	3
	Sometimes can print numbers from 1 to 20	4
	Can easily print numbers from 1 to 20	5
30.	SHAPES	
	Unable to reproduce shapes and designs presented by flash cards	1
	Difficulty in reproducing shapes and designs on flash cards	2
	Average ability in recalling shapes and designs on flash cards	3
	Sometimes has difficulty; few mistakes	4
	Superior ability in reproducing shapes and designs presented with flash cards	5
31.	RHYTHMIC PATTERNS	
	Unable to repeat rhythmic patterns (e.g., clapping hands)	1
	Usually has difficulty in repeating rhythmic patterns	2
	Average ability in repeating rhythmic patterns	3
	Above average ability in repeating rhythmic patterns	4
	Superior ability in repeating rhythmic patterns	5

AUDITORY DISCRIMINATION

32.	CONSONANTS	
	Unable to tell the difference between sounds (e.g., b & p; b & d; d & t; p & t)	1
	Has difficulty in auditorially discriminating the differences in letter names	2
	Average ability in differentiating between sounds (e.g., b & p; b & d; d & t; p & t)	3
	Above average ability in sound discrimination	4
	No difficulty at all in discriminating sounds	5
33.	VOWELS	
	Has extreme difficulty in auditorially discriminating between vowel sounds	1
	Usually has difficulty in differentiating between vowel sounds	2
	Has average ability in differentiating between vowel sounds	3
	Sometimes has difficulty in differentiating between vowel sounds	4
	Has no difficulty whatsoever in differentiating between vowel sounds	5
34.	WORDS	
	Unable to auditorially discriminate the differences and similarities in words	1
	Usually has difficulty in differentiating between words like mat and met	2
	Has average ability in differentiating between words like bat and pat	3
	Sometimes has difficulty in differentiating between words	4
	Has no difficulty in differentiating between similar sounding words	5

AUDITORY MEMORY

	RATING
35. IMMEDIATE MEMORY	
Has extreme difficulty in repeating back what he has just been told	1
Often has difficulty in repeating back what he has just been told	2
Has average ability in repeating instructions	3
Sometimes has difficulty in repeating back digits and words	4
Never has difficulty in repeating back what he has just been told	5
36. SHORT TERM MEMORY	
Unable to recall what was presented earlier that day to do his work	1
Often forgets what is taught in the morning (e.g., new word or letter)	2
Average ability in recalling what was taught earlier in the same day	3
Sometimes has difficulty in recalling what he learned that day	4
Superior ability in recalling what he learned that day	5
37. LONG TERM MEMORY	
Has extreme difficulty in remembering what he learned the day before	1
Often forgets what was taught the day before	2
Average ability in recalling words and letters taught the day before	3
Sometimes has difficulty in recalling the past day's work	4
Never has difficulty in recalling what was taught the day before	5

AUDITORY VISUAL ASSOCIATION

38. SOUNDS	
Unable to reproduce the sounds of letters that he hears	1
Great difficulty in repeating sounds of letters	2
Often cannot reproduce the sounds of letters which he hears	[✓ 3]
Sometimes has difficulty in repeating sounds of letters	4
Never has difficulty in reproducing the sounds of letters that he hears	5
39. SOUNDS AND LETTERS	
Unable to produce the phonetic sound of the letters that he sees	1
Has difficulty in associating sounds with the letter	2
Often cannot associate the sound with the letter	3
Sometimes has difficulty with phonics	4
Superior ability in phonics; no difficulty in sound-letter association	5
40. LETTERS AND SOUNDS	
Unable to write letters of the sounds that he hears	1
Cannot usually print letters that represent phonetic sounds	2
Adequate ability in printing letters of the sounds	3
Sometimes has difficulty in printing the letters of the sounds that he hears	4
Has superior ability in writing letters of the sounds that he hears	5

DIRECTIONALITY AND LATERALITY

41. LEFT-RIGHT	RATING
Unable to print in left to right progression on a page	1
Has difficulty in reading from left to right in his reader	2
Has adequate knowledge of left and right	3
Sometimes becomes confused between left and right	4
Never has difficulty with left and right	5

42. HAND DOMINANCE	
Never uses one hand consistently in printing	1
Often uses either left or right hand in printing	2
Sometimes uses both left and right hand in printing	3
Seldom uses both left and right hand	4
Always uses one hand consistently in printing	5

43. FOOT DOMINANCE	
Never uses one foot consistently when kicking a ball	1
Often uses either left or right foot when kicking a ball	2
Sometimes uses either left or right foot when kicking a ball	3
Seldom uses both left and right foot	4
Always uses one foot consistently when kicking the ball	5

CLASSROOM BEHAVIOUR

44. AUDITORY ATTENTION	
Has great difficulty in listening attentively	1
Hardly ever listens with attention	2
Has average listening ability	3
Sometimes is inattentive	4
Always is attentive and listens well	5

45. VISUAL ATTENTION	
Unable to attend to visual presentations, such as a picture	1
Often has difficulty in attending to a word displayed to the class	2
Has average ability in attending to visually presented material	3
Sometimes is inattentive when pictures or words are presented	4
Has superior ability in attending to visually presented material	5

46. PERSEVERANCE	
Unable to persist at his seat work until he completes it	1
Usually has difficulty in maintaining attention in order to finish work	2
Is able to attend and persist at seat work until completed	3
Sometimes has difficulty persisting at his seat work	4
Always attends and persists at his work	5

47. ON TASK BEHAVIOUR	
Stays on assigned work for less than five minutes	1
Stays on task for five to six minutes	2
Can work on task for seven or eight minutes	3
Can work on task for at least ten minutes	4
Can stay on task for longer than ten minutes	5

CLASSROOM BEHAVIOUR (CONTINUED)

	RATING
48. INDEPENDENCE	
Has great difficulty in solving problems by himself	1
Usually has difficulty in figuring out what to do	2
Often requires help in figuring things out	3
Sometimes has problems in figuring out what to do	4
Always knows what to do; does not need help	5
49. DISCIPLINE	
Unable to follow rules of the classroom	1
Usually tests the limits when asked to do something	2
Often has difficulty in following teacher rules	3
Follows classroom rules quite well	4
Very cooperative; follows rules willingly	5
50. WORKING WITH CLASSMATES	
Has great difficulty in working with classmates	1
Usually cannot work together with classmates	2
Often works alone; seems bothered by peers	3
Seldom has difficulty in working with peers	4
Works well with classmates	5
51. WORKING WITH ADULTS	
Unable to accept adult direction	1
Usually becomes irritated when offered adult direction	2
Often becomes frustrated when offered direction	3
Sometimes has difficulty in accepting adult direction	4
Appears to benefit from adult direction; does not get frustrated	5
52. PERSEVERATION I	
Has difficulty in setting aside one task and beginning another	1
Usually prefers to stick to one task until he finishes	2
Sometimes has difficulty in switching to another task	3
Has average ability in switching from one task to another	4
Has great flexibility in setting aside a task and beginning another	5

PERSONAL-SOCIAL BEHAVIOUR

53. COOPERATION	
Continually disrupts classroom; unable to inhibit responses	1
Frequently demands attention; often speaks out of turn	2
Waits his turn; average for age and grade	3
Above average; cooperates well	4
Excellent ability; cooperates without adult encouragement	5

PERSONAL-SOCIAL BEHAVIOUR (CONTINUED)

	RATING
54. ATTENTION	
Never attentive; very distractible	1
Rarely listens; attention frequently wanders	2
Attention adequate for age and grade	3
Above average in attention; almost always attends	4
Always attends to important aspects; long attention span	5
55. ORGANIZATION	
Highly disorganized; very slovenly	1
Often disorganized in manner of working; inexact, careless	2
Maintains average organization of work; careful	3
Above-average organization; organizes and completes work	4
Highly organized; completes assignments in meticulous manner	5
56. NEW SITUATIONS (parties, trips, changes in routine)	
Becomes extremely excitable, totally lacking in self-control	1
Often overreacts; finds new situations disturbing	2
Adapts adequately for age and grade	3
Adapts easily and quickly with self-confidence	4
Excellent adaptation; shows initiative and independence	5
57. SOCIAL ACCEPTANCE	
Avoided by others	1
Tolerated by others	2
Liked by others; average for age and grade	3
Well liked by others	4
Sought by others	5
58. RESPONSIBILITY	
Rejects responsibility; never initiates activities	1
Avoids responsibility; limited acceptance of role for age	2
Accepts responsibility; adequate for age and grade	3
Above average in responsibility; enjoys responsibility; initiates and volunteers	4
Seeks responsibility; almost always takes initiative with enthusiasm	6
59. COMPLETION OF ASSIGNMENTS	
Never finishes even with guidance	1
Seldom finishes even with guidance	2
Average performance; follows through on assignments	3
Above-average performance; completes assignments without urging	4
Always completes assignments without supervision	5
60. TACTFULNESS	
Always rude	1
Usually disregards feelings of others	2
Average tact; behavior occasionally inappropriate socially	3
Above average in tactfulness; behavior rarely inappropriate socially	4
Always tactful; behavior never socially inappropriate	5

APPENDIX E

The Grade One Rating Scale

(Preliminary Form)

THE GRADE ONE RATING SCALE

Screening for Learning Difficulties

Department of Educational Psychology
University of Alberta

PUPIL'S NAME ______________________ SEX ___ BIRTH DATE ____________
Year Month Day

SCHOOL ______________________

TEACHER ______________________

TO THE TEACHER

The purpose of the Student Rating Scale is to identify those children who have learning difficulties. It should not be used as an indicator of inferior potential nor of lack of opportunity to learn. It is important, therefore, that your ratings be made only on the basis of the items listed on the Scale.

You are to rate each child in various behavioural areas, all of which are related to success in learning. The ratings are made on a five-point scale. A rating of 3 is average, ratings of 1 or 2 are below average, and ratings of 4 or 5 are above average. A rating of 1 is the lowest and a rating of 5 is the highest that can be given. Indicate your rating by circling the number that represents your judgment of the child's level of function. When making your evaluation, rate only one area of behaviour at a time and bear in mind that a child may be learning well in some respects but not in others.

Behavioural Characteristics

CENTRAL PROCESSING SUBTEST

	RATING
1. WORDS	
Extreme difficulty in visual discrimination of differences and similarities in words	1
Unable to tell the difference between words like was and saw, horse and house	2
Average ability in differentiating between words	3
Above average ability in telling the difference between words	4
Superior ability; no trouble differentiating between words	5
2. WORDS AND LETTERS	
Unable to remember sight words after practice and drill	1
Has difficulty in arranging letters in the same sequence as presented by teacher	2
Adequate ability in remembering letters and words presented visually	3
Sometimes has difficulty with sight words	4
Superior ability in remembering sight words	5
3. NUMBERS	
Has great difficulty in printing numbers 1 to 20	1
Usually can print numbers from 1 to 20	2
Average knowledge of numbers from 1 to 20	3
Sometimes can print numbers from 1 to 20	4
Can easily print numbers from 1 to 20	5
4. SHAPES	
Unable to reproduce shapes and designs presented by flash cards	1
Difficulty in reproducing shpaes and designs on flash cards	2
Average ability in recalling shapes and designs on flash cards	3
Sometimes has difficulty; few mistakes	4
Superior ability in reproducing shapes and designs presented with flash cards	5
5. RHYTHMIC PATTERNS	
Unable to repeat rhythmic patterns (e.g., clapping hands)	1
Usually has difficulty in repeating rhythmic patterns	2
Average ability in repeating rhythmic patterns	3
Above average ability in repeating rhythmic patterns	4
Superior ability in repeating rhythmic patterns	5
6. CONSONANTS	
Unable to tell the difference between sounds (e.g., b & p; b & d; d & t; p & t)	1
Has difficulty in auditorially discriminating the differences in letter names	2
Average ability in differentiating between sounds (e.g., b & p; b & d; d &t; p & t)	3
Above average ability in sound discrimination	4
No difficulty at all in discriminating sounds	5
7. VOWELS	
Has extreme difficulty in auditorially discriminating between vowel sounds	1
Usually has difficulty in differentiating between vowel sounds	2
Has average ability in differentiating between vowel sounds	3
Sometimes has difficulty in differentiating between vowel sounds	4
Has no difficulty whatsoever in differentiating between vowel sounds	5

	RATING
8. WORDS	
Unable to auditorially discriminate the differences and similarities in words	1
Usually has difficulty in differentiating between words like mat and met	2
Has average ability in differentiating between words like bat and pat	3
Sometimes has difficulty in differentiating between words	4
Has no difficulty in differentiating between similar sounding words	5
9. SOUNDS	
Unable to reproduce the sounds of letters that he hears	1
Great difficulty in repeating sounds of letters	2
Often cannot reproduce the sounds of letters which he hears	3
Sometimes has difficulty in repeating sounds of letters	4
Never has difficulty in reproducing the sounds of letters that he hears	5
10. SOUNDS AND LETTERS	
Unable to produce the phonetic sound of the letters that he sees	1
Has difficulty in associating sounds with the letter	2
Often cannot associate the sound with the letter	[✓ 3]
Sometimes has difficulty with phonics	4
Superior ability in phonics; no difficulty in sound-letter association	5
11. LETTERS AND SOUNDS	
Unable to write letters of the sounds that he hears	1
Cannot usually print letters that represent phonetic sounds	2
Adequate ability in printing letters of the sounds	3
Sometimes has difficulty in printing the letters of the sounds that he hears	4
Has superior ability in writing letters of the sounds the he hears	5
12. LEFT-RIGHT	
Unable to print in left to right progression on a page 5	1
Has difficulty in reading from left to right in his reader	2
Has adequate knowledge of left and right	[✓ 3]
Sometimes becomes confused between left and right	4
Never has difficulty with left and right	5

Subtest Score ____

LANGUAGE AND COGNITIVE SUBTEST

13. COMPREHENDING WORD MEANINGS	
Extremely immature level of understanding	1
Fails to grasp simple word meanings; misunderstands words at grade level	2
Good grasp of vocabulary for age and grade	3
Understands all grade-level vocabulary as well as higher-level word meanings	4
Superior understanding of vocabulary; understands many abstract words	5
14. FOLLOWING INSTRUCTIONS	
Unable to follow instructions; always confused	1
Usually follows simple instructions but often needs individual help	2
Follows instructions that are familiar and not complex	3
Remembers and follows extended instructions	4
Unusually skillful in remembering and following instructions	5

	RATING
15. COMPREHENDING CLASS DISCUSSIONS	
Unable to follow and understand class discussions; always inattentive	1
Listens but rarely understands well; mind often wanders	2
Listens and follows discussions according to age and grade	3
Understands well; benefits from discussions	4
Becomes involved; shows unusual understanding of material	5
16. RETAINING INFORMATION	
Almost total lack of recall; poor memory	1
Retains simple ideas and procedures if repeated	2
Average retention of materials; adequate memory for age and grade	3
Remembers information from various sources; good immediate and delayed recall	4
Superior memory for details and content	5
17. COMPREHENDING STORIES	
Unable to answer questions about a simple story that has been read by you	1
Often gives wrong answers to questions about story which you have read	2
Occasionally gives wrong answers to questions about the story	3
Above average in understanding the story and answering questions	4
Exceptional ability in understanding the story and answering questions without error	5
18. VOCABULARY	
Always uses immature, poor vocabulary	1
Limited vocabulary, primarily simple nouns; few precise, descriptive words	2
Adequate vocabulary for age and grade	3
Above-average vocabulary; uses numerous precise, descriptive words	4
High-level vocabulary; always uses precise words; conveys abstractions	5
19. GRAMMAR	
Always uses incomplete sentences with grammatical errors	1
Frequently uses incomplete sentences; numerous grammatical errors	2
Uses correct grammar; few errors in use of prepositions, verb tense, pronouns	3
Above average oral language; rarely makes grammatical errors	4
Always speaks in grammatically correct sentences	5
20. WORD RECALL	
Unable to recall the exact word	1
Often gropes for words to express himself	2
Occasionally searches for correct word; recall adequate for age and grade	3
Above average; rarely hesitates on a word	4
Always speaks well; never hesitates or substitutes	5
21. STORYTELLING--RELATING EXPERIENCES	
Unable to tell a comprehensible story	1
Difficulty relating ideas in a logical sequence	2
Average; adequate for age and girls	3
Above average; uses logical sequence	4
Exceptional; relates ideas in a logical, meaningful manner	5
22. FORMULATING IDEAS	
Unable to relate isolated facts	1
Difficulty relating isolated facts; incomplete and scattered ideas	2
Usually relates facts meaningfully; relates facts adequately for age and grade	3
Above average; relates facts and ideas well	4
Outstanding; always relates facts appropriately	5

	RATING
23. STORYTELLING--PICTURES	
Great difficulty in telling a story from a picture; merely labels objects	1
Cannot relate main ideas represented in the picture	2
Usually is aboe to tell a story from a picture	3
Above average ability in telling a story from a picture	4
Superior ability in relating the main ideas in the picture	5
24. CLARITY OF SPEECH	
Speech always unclear; extremely difficult to understand	1
At times quite difficult to understand speech	2
Most times easily understood; no difficulty in understanding his speech.	3
Speaks clearly enough to be understood by you	4
Speech is extremely clear; can be readily understood by you	5
Subtest score	____

CLASSROOM BEHAVIOUR

25. AUDITORY ATTENTION	
Has great difficulty in listening attentively	1
Hardly ever listens with attention	2
Has average listening ability	3
Sometimes is inattentive	4
Always is attentive and listens well	5
26. VISUAL ATTENTION	
Unable to attend to visual presentations, such as a picture	1
Often has difficulty in attending to a word displayed to the class	2
Has average ability in attending to visually presented material	3
Sometimes is inattentive when pictures or words are presented	4
Has superior ability in attending to visually presented material	5
27. PERSEVERANCE	
Unable to persist at his seat work until he complete it	1
Usually has difficulty in maintaining attention in order to finish work	2
Is able to attend and persist at seat work until completed	3
Sometimes has difficulty persisting at his seat work	4
Always attends and persists at his work	5
28. ON TASK BEHAVIOUR	
Stays on assigned work for less than five minutes	1
Stays on task for five to six minutes	2
Can work on task for seven or eight minutes	3
Can work on task for at least ten minutes	4
Can stay on task for longer than ten minutes	5
29. INDEPENDENCE	
Has great difficulty in solving problems by himself	1
Usually has difficulty in figuring out what to do	2
Often requires help in figuring things out	3
Sometimes has problems in figuring out what to do	4
Always knows what to do; does not need help	5

	RATING
30. DISCIPLINE	
Unable to follow rules of the classroom	1
Usually tests the limits when asked to do something	2
Often has difficulty in following teacher rules	3
Follows classroom rules quite well	4
Very cooperative; follows rules willingly	5
31. WORKING WITH CLASSMATES	
Has great difficulty in working with classmates	1
Usually cannot work together with classmates	2
Often works alone; seems bothered by peers	3
Seldom has difficulty in working with peers	4
Works well with classmates	5
32. COOPERATION	
Continually disrupts classroom; unable to inhibit responses	1
Frequently demands attention; often speaks out of turn	2
Waits his turn; average for age and grade	3
Above average; cooperates well	4
Excellent ability; cooperates without adult encouragement	5
33. ATTENTION	
Never attentive; very distractible	1
Rarely listens; attention frequently wanders	2
Attention adequate for age and grade	3
Above average in attention; amost always attends	4
Always attends to important aspects; long attention span	5
34. ORGANIZATION	
Highly disorganized; very slovenly	1
Often disorganized in manner of working; inexact, careless	2
Maintains average organization of work; careful	3
Above-average organization; organizes and completes work	4
Highly organized; completes assignments in meticulous manner	5
35. NEW SITUATIONS (parties, trips, changes in routine)	
Becomes extremely excitable, totally lacking in self-control	1
Often overreacts; finds new situations disturbing	2
Adapts adequately for age and grade	3
Adapts easily and quickly with self-confidence	4
Excellent adaptation; shows initiative and independence	5
36. COMPLETION OF ASSIGNMENTS	
Never finishes even with guidance	1
Seldom finishes even with guidance	2
Average performance; follows through on assignments	3
Above-average performance; completes assignments without urging	4
Always completes assignments without supervision	5

37. TACTFULNESS

	RATING
Always rude	1
Usually disregards feelings of others	2
Average tact; behaviour occasionally inappropriate socially	3
Above average in tactfulness; behaviour rarely inappropriate socially	4
Always tactful; behaviour never socially inappropriate	5

Subtest score ____

AUDITORY MEMORY

38. IMMEDIATE MEMORY

Has extreme difficulty in repeating back what he has just been told	1
Often has difficulty in repeating back what he has just been told	2
Has average ability in repeating instructions	3
Sometimes has difficulty in repeating back digits and words	4
Never has difficulty in repeating back what he has just been told	5

39. SHORT TERM MEMORY

Unable to recall what was presented earlier that day to do his work	1
Often forgets what is taught in the morning (e.g., new woed or letter)	2
Average ability in recalling what was taught earlier in the same day	3
Sometimes has difficulty in recalling what he learned that day	4
Superior ability in recalling what he learned that day	5

40. LONG TERM MEMORY

Has extreme difficulty in remembering what he learned that day before	1
Often forgets what was taught the day before	2
Average ability in recalling words and letters taught the day before	3
Sometimes has difficulty in recalling the past day's work	4
Never has difficulty in recalling what was taught the day before	5

Subtest score ____

GROSS MOTOR

41. GENERAL COORDINATION (walking, running, hopping, climbing)

Very poorly coordinated; clumsy	1
Below average; awkward	2
Average for age; graceful	3
Above average; does well in motor activities	4
Excels in coordination	5

42. BALANCE

Very poor balance	1
Below-average ability; fails frequently	2
Average ability for age; adequate equilibrium	3
Above-average ability in activities requiring balance	4
Excels in balance	5

	RATING
43. MANUAL DEXTERITY	
Very poor in manual dexterity	1
Awkward; below average in dexterity	2
Adequate dexterity for age; manipulates well	3
Above-average dexterity	4
Excels; readily manipulates new equipment	5
Subtest score	____

FINE MOTOR

44. PRINTING	
Unable to print his letters properly	1
Has difficulty in printing his letters	2
Has average ability in printing	3
Has above average ability in printing	4
Has superior ability in printing	5
45. COLOURING	
Unable to colour pictures without going over boundaries	1
Has difficulty in keeping within boundaries of a picture he is colouring	2
Has average ability in colouring	3
Has above average ability in colouring	4
Superior ability in colouring	5
46. COPYING	
Has great difficulty in copying a simple sentence correctly	1
Usually cannot copy a sentence from the board correctly	2
Often has difficulty; reverses words in a sentence	3
Sometimes finds it difficult to copy properly	4
Never has difficulty in copying a sentence correctly	5
Subtest score	____

VISUAL DISCRIMINATION I

47. COLOURS	
Unable to match colours correctly	1
Usually has difficulty in matching colours	2
Has average ability in matching colours	3
Sometimes has difficulty in matching colours	4
Never has difficulty in matching colours	5
48. LETTERS	
Unable to match letters correlty	1
Usually has difficulty in matching letters	2
Has average ability in matching letters	3
Sometimes has difficulty in matching letters	4
Never has difficulty in matching letters	5
Subtest score	____

RATING

CONTROL

49.	WORKING WITH ADULTS	
	Unable to accept adult direction	1
	Usually becomes irritated when offered adult direction	2
	Often becomes frustrated when offered direction	3
	Sometimes has difficulty in accepting adult direction	4
	Appears to benefit from adult direction; does not get frustrated	5
50.	PERSEVERATION I	
	Has difficulty in setting aside one task and beginning another	1
	Usually prefers to stick to one task until he finishes	2
	Sometimes has difficulty in switching to another task	3
	Has average ability in switching from one task to another	4
	Subtest score	____

VISUAL DISCRIMINATION II

51.	PICTURES	
	Unable to perceive missing parts of pictures or puzzles	1
	Usually has difficulty in perceiving missing parts of pictures or puzzles	2
	Has average ability in perceiving missing parts of pictures or puzzles	3
	Sometimes has difficulty in perceiving missing parts of pictures or puzzles	4
	Never has difficulty perceiving missing parts of pictures or puzzles	5
52.	TRACING	
	Unable to trace around an object or picture	1
	Usually has difficulty in tracing around an object or picture	2
	Has average ability in tracing	3
	Sometimes has difficulty in tracign	4
	Has superior ability in tracing an object or picture	5
	Subtest score	____

APPENDIX F

The Grade One Rating Scale (Final Form) Normative Data and Directions for Administration and Scoring

THE GRADE ONE RATING SCALE

Screening for Learning Difficulties

Department of Educational Psychology
University of Alberta

PUPIL'S NAME ______________________ SEX ___ BIRTH DATE ____________
Year Month Day

SCHOOL ______________________

TEACHER ______________________

TO THE TEACHER

The purpose of the Student Rating Scale is to identify those children who have learning difficulties. It should not be used as an indicator of inferior potential nor of lack of opportunity to learn. It is important, therefore, that your ratings be made only on the basis of the items listed on the Scale.

You are to rate each child in various behavioural areas, all of which are related to success in learning. The ratings are made on a five-point scale. A rating of 3 is average, ratings of 1 or 2 are below average, and ratings of 4 or 5 are above average. A rating of 1 is the lowest and a rating of 5 is the highest that can be given. Indicate your rating by circling the number that represents your judgment of the child's level of function. When making your evaluation, rate only one area of behaviour at a time and bear in mind that a child may be learning well in some respects but not in others.

Behavioural Characteristics

CENTRAL PROCESSING SUBTEST

		RATING
	WORDS	
1.	Extreme difficulty in visual discrimination of differences and similarities in words	1
	Unable to tell the difference between words like was and saw, horse and house	2
	Average ability in differentiating between words	3
	Above average ability in telling the difference between words	4
	Superior ability; no trouble differentiating between words	5
2.	WORDS AND LETTERS	
	Unable to remember sight words after practice and drill	1
	Has difficulty in arranging letters in the same sequence as presented by teacher	2
	Adequate ability in remembering letters and words presented visually	3
	Sometimes has difficulty with sight words	4
	Superior ability in remembering sight words	5
3.	NUMBERS	
	Has great difficulty in printing numbers 1 to 20	1
	Usually can print numbers from 1 to 20	2
	Average knowledge of numbers from 1 to 20	3
	Sometimes can print numbers from 1 to 20	4
	Can easily print numbers from 1 to 20	5
4.	SHAPES	
	Unable to reproduce shapes and designs presented by flash cards	1
	Difficulty in reproducing shpaes and designs on flash cards	2
	Average ability in recalling shapes and designs on flash cards	3
	Sometimes has difficulty; few mistakes	4
	Superior ability in reproducing shapes and designs presented with flash cards	5
5.	RHYTHMIC PATTERNS	
	Unable to repeat rhythmic patterns (e.g., clapping hands)	1
	Usually has difficulty in repeating rhythmic patterns	2
	Average ability in repeating rhythmic patterns	3
	Above average ability in repeating rhythmic patterns	4
	Superior ability in repeating rhythmic patterns	5
6.	CONSONANTS	
	Unable to tell the difference between sounds (e.g., b & p; b & d; d & t; p & t)	1
	Has difficulty in auditorially discriminating the differences in letter names	2
	Average ability in differentiating between sounds (e.g., b & p; b & d; d &t; p & t)	3
	Above average ability in sound discrimination	4
	No difficulty at all in discriminating sounds	5
7.	VOWELS	
	Has extreme difficulty in auditorially discriminating between vowel sounds	1
	Usually has difficulty in differentiating between vowel sounds	2
	Has average ability in differentiating between vowel sounds	3
	Sometimes has difficulty in differentiating between vowel sounds	4
	Has no difficulty whatsoever in differentiating between vowel sounds	5

8. WORDS	RATING
Unable to auditorially discriminate the differences and similarities in words	1
Usually has difficulty in differentiating between words like mat and met	2
Has average ability in differentiating between words like bat and pat	3
Sometimes has difficulty in differentiating between words	4
Has no difficulty in differentiating between similar sounding words	5

9. SOUNDS	
Unable to reproduce the sounds of letters that he hears	1
Great difficulty in repeating sounds of letters	2
Often cannot reproduce the sounds of letters which he hears	3
Sometimes has difficulty in repeating sounds of letters	4
Never has difficulty in reproducing the sounds of letters that he hears	5

10. SOUNDS AND LETTERS	
Unable to produce the phonetic sound of the letters that he sees	1
Has difficulty in associating sounds with the letter	2
Often cannot associate the sound with the letter	3
Sometimes has difficulty with phonics	4
Superior ability in phonics; no difficulty in sound-letter association	5

11. LETTERS AND SOUNDS	
Unable to write letters of the sounds that he hears	1
Cannot usually print letters that represent phonetic sounds	2
Adequate ability in printing letters of the sounds	3
Sometimes has difficulty in printing the letters of the sounds that he hears	4
Has superior ability in writing letters of the sounds the he hears	5

12. LEFT-RIGHT	
Unable to print in left to right progression on a page	1
Has difficulty in reading from left to right in his reader	2
Has adequate knowledge of left and right	3
Sometimes becomes confused between left and right	4
Never has difficulty with left and right	5

Subtest Score ____

LANGUAGE AND COGNITIVE SUBTEST

13. COMPREHENDING WORD MEANINGS	
Extremely immature level of understanding	1
Fails to grasp simple word meanings; misunderstands words at grade level	2
Good grasp of vocabulary for age and grade	3
Understands all grade-level vocabulary as well as higher-level word meanings	4
Superior understanding of vocabulary; understands many abstract words	5

14. FOLLOWING INSTRUCTIONS	
Unable to follow instructions; always confused	1
Usually follows simple instructions but often needs individual help	2
Follows instructions that are familiar and not complex	3
Remembers and follows extended instructions	4
Unusually skillful in remembering and following instructions	5

	RATING
15. COMPREHENDING CLASS DISCUSSIONS	
Unable to follow and understand class discussions; always inattentive	1
Listens but rarely understands well; mind often wanders	2
Listens and follows discussions according to age and grade	3
Understands well; benefits from discussions	4
Becomes involved; shows unusual understanding of material	5
16. RETAINING INFORMATION	
Almost total lack of recall; poor memory	1
Retains simple ideas and procedures if repeated	2
Average retention of materials; adequate memory for age and grade	3
Remembers information from various sources; good immediate and delayed recall	4
Superior memory for details and content	5
17. COMPREHENDING STORIES	
Unable to answer questions about a simple story that has been read by you	1
Often gives wrong answers to questions about story which you have read	2
Occasionally gives wrong answers to questions about the story	3
Above average in understanding the story and answering questions	4
Exceptional ability in understanding the story and answering questions without error	5
18. VOCABULARY	
Always uses immature, poor vocabulary	1
Limited vocabulary, primarily simple nouns; few precise, descriptive words	2
Adequate vocabulary for age and grade	3
Above-average vocabulary; uses numerous precise, descriptive words	4
High-level vocabulary; always uses precise words; conveys abstractions	5
19. GRAMMAR	
Always uses incomplete sentences with grammatical errors	1
Frequently uses incomplete sentences; numerous grammatical errors	2
Uses correct grammar; few errors in use of prepositions, verb tense, pronouns	3
Above average oral language; rarely makes grammatical errors	4
Always speaks in grammatically correct sentences	5
20. WORD RECALL	
Unable to recall the exact word	1
Often gropes for words to express himself	2
Occasionally searches for correct word; recall adequate for age and grade	3
Above average; rarely hesitates on a word	4
Always speaks well; never hesitates or substitutes	5
21. STORYTELLING--RELATING EXPERIENCES	
Unable to tell a comprehensible story	1
Difficulty relating ideas in a logical sequence	2
Average; adequate for age and girls	3
Above average; uses logical sequence	4
Exceptional; relates ideas in a logical, meaningful manner	5
22. FORMULATING IDEAS	
Unable to relate isolated facts	1
Difficulty relating isolated facts; incomplete and scattered ideas	2
Usually relates facts meaningfully; relates facts adequately for age and grade	3
Above average; relates facts and ideas well	4
Outstanding; always relates facts appropriately	5

	RATING
23. STORYTELLING--PICTURES	
Great difficulty in telling a story from a picture; merely labels objects	1
Cannot relate main ideas represented in the picture	2
Usually is aboe to tell a story from a picture	3
Above average ability in telling a story from a picture	4
Superior ability in relating the main ideas in the picture	5
24. CLARITY OF SPEECH	
Speech always unclear; extremely difficult to understand	1
At times quite difficult to understand speech	2
Most times easily understood; no difficulty in understanding his speech	3
Speaks clearly enough to be understood by you	4
Speech is extremely clear; can be readily understood by you	5
Subtest score	___

AUDITORY MEMORY

25. IMMEDIATE MEMORY	
Has extreme difficulty in repeating back what he has just been told	1
Often has difficulty in repeating back what he has just been told	2
Has average ability in repeating instructions	3
Sometimes has difficulty in repeating back digits and words	4
Never has difficulty in repeating back what he has just been told	5
26. SHORT TERM MEMORY	
Unable to recall what was presented earlier that day to do his work	1
Often forgets what is taught in the morning (e.g., new woed or letter)	2
Average ability in recalling what was taught earlier in the same day	3
Sometimes has difficulty in recalling what he learned that day	4
Superior ability in recalling what he learned that day	5
27. LONG TERM MEMORY	
Has extreme difficulty in remembering what he learned that day before	1
Often forgets what was taught the day before	2
Average ability in recalling words and letters taught the day before	3
Sometimes has difficulty in recalling the past day's work	4
Never has difficulty in recalling what was taught the day before	5
Subtest score	___

CONTROL

28. WORKING WITH ADULTS	
Unable to accept adult direction	1
Usually becomes irritated when offered adult direction	2
Often becomes frustrated when offered direction	3
Sometimes has difficulty in accepting adult direction	4
Appears to benefit from adult direction; does not get frustrated	5

29. PERSEVERATION I

Has difficulty in setting aside one task and beginning another	1
Usually prefers to stick to one task until he finishes	2
Sometimes has difficulty in switching to another task	3
Has average ability in switching from one task to another	4

Subtest score ____

VISUAL DISCRIMINATION II

30. PICTURES

Unable to perceive missing parts of pictures or puzzles	1
Usually has difficulty in perceiving missing parts of pictures or puzzles	2
Has average ability in perceiving missing parts of pictures or puzzles	3
Sometimes has difficulty in perceiving missing parts of pictures or puzzles	4
Never has difficulty perceiving missing parts of pictures or puzzles	5

31. TRACING

Unable to trace around an object or picture	1
Usually has difficulty in tracing around an object or picture	2
Has average ability in tracing	3
Sometimes has difficulty in tracign	4
Has superior ability in tracing an object or picture	5

Subtest score ____

FINE MOTOR

32. PRINTING

Unable to print his letters properly	1
Has difficulty in printing his letters	2
Has average ability in printing	3
Has above average ability in printing	4
Has superior ability in printing	5

33. COLOURING

Unable to colour pictures without going over boundaries	1
Has difficulty in keeping within boundaries of a picture he is colouring	2
Has average ability in colouring	3
Has above average ability in colouring	4
Superior ability in colouring	5

34. COPYING

Has great difficulty in copying a simple sentence correctly	1
Usually cannot copy a sentence from the board correctly	2
Often has difficulty; reverses words in a sentence	3
Sometimes finds it difficult to copy properly	4
Never has difficulty in copying a sentence correctly	5

Subtest score ____

SCORING AND USE OF THE GRADE ONE RATING SCALE

Scoring

Each subtest is scored individually. To obtain the subtest score for each pupil, add the ratings you have assigned in that subtest. This total is the subtest score.

Use of the Rating Scale

The Grade One Rating Scale was devised to serve as a screening instrument for teacher use in the identification of children with potential learning difficulties. Subtest scores can be used to identify those pupils who have difficulty in reading, arithmetic, or overall achievement. Those pupils who received scores below the cutting scores on any of the subtests should be referred for a thorough assessment. The subtests and their corresponding cutting scores are presented in Table 1.

In addition to the use of subtest scores as cutting scores, the total of the individual subtest scores for each criterion can also be used as the cutting score. These cutting scores which are a composite of the indivdual subtest scores are given below for both reading and arithmetic, and total achievement.

	Boys	Girls
Reading	67	39
Arithmetic	29	39
Total Achievement	66	49

Thus any girl or boy who received a total score below that listed above can be considered as a potential failure in that subject area or in overall grade achievement.

Table 1

Means, Standard Deviations and Cutting Scores for Subtests of the Grade One Rating Scale

		Means				Standard Deviations				Cutting Scores*			
Subtests	Criterion	1	2	3	4	1	2	3	4	1	2	3	4
						BOYS							
CP, LC, C, VDII	Total Reading	42.18	37.42	8.21	7.32	9.13	8.12	1.27	1.45	27	27	7	6
CP	Arithmetic	42.18				9.13				29			
CP, LC, VDII	Total Achievement	42.18	37.42	7.32		9.13	8.12	1.45		31	29	6	
						GIRLS							
CP, C, VDII	Total Reading	44.98	8.63	7.64		9.04	1.12	1.59		25	7	7	
CP, C, VDII	Arithmetic	44.98	8.63	7.64		9.04	1.12	1.59		25	7	7	
CP, C, VDII	Total Achievement	44.98	8.63	7.64		9.04	1.12	1.59		35	7	7	

*Cutting scores for each of the subtests were calculated by using the regression equations for each criterion. Criterion cut off scores (X) were inserted into the equation $(X = a+b_1x_2+b_2x_3+b_3x4)$ which in turn was used to solve for the corresponding subtest scores. These scores were the subtest cutting scores. The criterion scores of one standard deviation below the mean was chosen as the cut off score. Thus 18% of the pupils below this cut off point were considered as having potential learning difficulties. This corresponds to the estimates of learning difficulties in school age children provided by Roberts and Lazure, (1970).

APPENDIX G

Results of Principal Components Factor Analysis for Combined Sample and Boys and Girls Separately

	COMMUNALITIES	1	2	3	4	5	6	7	8	9	10	11
1	0.700	0.516	0.591	0.126	0.208	0.167	0.088	0.056	-0.018	0.120	-0.081	[illegible]
2	0.700	0.573	0.393	0.254	0.430	0.125	0.133	0.098	0.139	0.069	0.009	[illegible]
3	0.752	0.451	0.513	0.293	0.352	0.173	0.007	0.195	0.050	0.069	-0.032	0.971
4	0.775	0.517	0.516	0.187	0.301	0.250	0.070	0.132	0.078	0.069	0.783	0.019
5	0.714	0.407	0.550	0.229	0.307	0.100	0.170	0.048	-0.059	0.150	0.035	0.639
6	0.700	0.379	0.707	0.181	0.105	0.105	0.151	0.050	0.017	0.127	-0.000	0.942
7	0.718	0.341	0.670	0.150	0.020	0.156	0.105	-0.030	0.130	0.150	-0.031	0.116
8	0.755	0.413	0.606	0.154	0.113	0.118	0.100	0.151	0.000	0.060	0.176	0.057
9	0.709	0.360	0.712	0.146	0.100	0.221	0.000	0.293	-0.020	-0.078	0.300	-0.047
10	0.702	0.402	0.663	0.135	0.103	0.242	0.090	0.265	0.017	-0.069	0.656	-0.017
11	0.723	0.333	0.460	0.270	0.000	0.259	0.151	0.150	0.073	0.013	-0.100	-0.052
12	0.690	0.195	0.590	-0.032	0.132	0.173	0.170	0.090	0.313	0.190	-0.015	0.250
13	0.734	0.235	0.238	0.363	0.550	0.290	0.110	0.135	0.100	0.103	0.010	0.093
14	0.735	0.400	0.290	0.107	0.015	0.035	0.110	0.317	0.170	0.201	0.150	-0.052
15	0.663	0.540	0.038	0.142	0.200	0.107	0.150	0.205	-0.004	0.300	0.120	0.011
16	0.670	0.476	0.558	0.008	0.303	0.016	-0.010	0.077	-0.007	0.120	0.097	0.034
17	0.669	0.770	0.742	0.129	0.150	0.790	0.108	0.901	0.003	0.369	0.095	0.111
18	0.671	0.130	0.708	0.130	0.059	0.055	0.120	0.107	0.076	0.052	0.057	-0.015
19	0.659	0.770	0.708	0.171	0.131	0.777	0.707	0.007	0.006	-0.030	-0.023	0.042
20	0.761	0.350	0.173	0.208	0.204	0.200	0.000	0.071	0.110	-0.045	0.047	0.049
21	0.750	0.140	0.183	0.273	[illegible]	0.191	0.737	0.100	0.073	0.059	-0.059	0.372
22	0.717	0.342	0.507	0.150	[illegible]	0.237	0.007	0.050	-0.013	-0.037	0.003	0.040
23	0.730	0.757	0.135	0.131	-0.007	0.000	0.006	0.719	0.000	0.077	0.055	0.030
24	0.720	0.440	0.302	0.100	0.101	0.003	0.170	0.111	-0.027	0.260	0.113	-0.073
25	0.689	0.405	0.201	0.105	0.159	0.051	0.271	0.596	0.050	0.193	-0.010	0.071
26	0.700	0.440	0.300	0.102	0.001	0.007	0.100	0.007	0.001	0.574	0.010	0.013
27	0.700	0.304	0.352	0.109	0.120	0.126	0.000	0.147	-0.007	0.387	-0.049	0.057
28	0.705	0.717	0.314	0.100	0.170	0.115	0.105	0.000	0.007	0.136	-0.107	0.023
29	0.676	0.494	0.149	0.140	0.170	0.077	0.006	0.510	0.000	-0.149	0.095	0.043
30	0.697	0.550	0.031	0.209	0.001	0.001	0.313	0.157	-0.023	0.090	0.250	-0.040
31	0.739	0.409	0.052	0.307	-0.002	0.200	0.777	-0.007	0.105	-0.170	0.231	-0.000
32	0.793	0.779	0.305	0.130	0.103	0.101	0.100	0.077	0.001	-0.019	0.101	-0.070
33	0.760	0.722	0.200	0.107	0.000	0.201	0.120	0.000	0.171	0.102	0.085	-0.099
34	0.811	0.759	0.303	0.175	0.100	0.130	0.107	0.005	0.150	0.053	0.042	-0.010
35	0.700	0.520	0.347	0.221	0.050	0.100	0.105	0.190	0.070	-0.019	0.072	-0.115
36	0.859	0.500	0.355	0.200	0.030	0.159	0.105	0.105	-0.009	0.066	-0.330	-0.003
37	0.693	0.431	0.350	0.200	0.305	0.137	0.140	0.170	0.037	-0.032	0.526	-0.003
38	0.771	0.402	0.303	0.172	0.050	0.074	0.097	0.313	0.217	-0.057	-0.109	0.134
39	0.887	0.750	0.200	0.191	0.075	0.119	0.000	0.253	0.120	0.043	-0.370	0.120
40	0.777	0.707	0.333	0.100	0.000	0.101	0.101	0.140	0.110	0.043	-0.076	0.050
41	0.650	0.676	0.135	0.705	-0.155	0.109	0.200	0.053	-0.105	0.132	0.063	0.219
42	0.700	0.340	0.077	0.059	0.050	0.077	0.006	0.009	0.132	-0.100	0.170	0.070
43	0.600	0.610	0.003	0.030	0.570	0.190	-0.035	0.060	0.031	0.060	0.842	0.175
44	0.702	0.618	0.237	0.533	0.077	0.050	0.100	0.085	-0.050	0.578	0.020	0.120
45	0.797	0.050	0.257	0.050	0.005	0.002	0.191	-0.030	-0.011	0.007	-0.091	0.098
46	0.790	0.368	0.150	0.513	0.009	0.005	0.300	0.005	0.195	-0.030	0.088	0.093
47	0.729	0.200	0.102	0.349	0.507	0.100	0.170	0.091	0.240	-0.019	0.049	0.110
48	0.897	0.092	0.793	0.311	0.003	0.105	0.056	0.113	0.110	-0.005	0.170	0.091
49	0.776	0.177	0.006	0.700	0.777	0.013	0.007	0.107	0.000	-0.050	-0.031	0.142
50	0.790	0.417	0.112	0.700	0.310	0.120	0.077	0.000	0.000	0.230	-0.030	0.110
51	0.761	-0.005	0.047	0.305	0.005	0.070	0.039	0.100	0.415	-0.023	-0.220	0.256
52	0.733	0.218	0.005	0.200	0.201	0.150	0.007	-0.050	0.465	0.002	0.223	0.033
53	0.725	0.160	0.108	0.775	0.130	0.001	0.150	0.120	0.000	-0.003	-0.044	0.117
54	[illegible]	0.300	0.320	0.507	0.017	0.100	0.730	-0.030	0.000	-0.005	0.330	-0.019
55	0.772	0.700	0.700	0.072	0.310	0.100	0.050	0.000	0.120	0.015	-0.017	0.017
56	0.507	0.777	0.603	0.000	0.140	0.071	0.270	0.006	0.211	0.151	0.128	-0.210
57	0.600	0.105	0.720	0.540	-0.005	0.320	0.025	0.035	0.133	0.140	0.047	-0.143
58	0.603	0.241	0.300	0.350	0.100	0.200	0.103	0.050	0.245	0.200	-0.014	-0.109
59	0.730	0.312	0.270	0.513	0.000	0.131	0.320	0.007	0.163	0.115	0.007	-0.103
60	0.710	0.477	0.570	0.010	0.010	0.075	0.007	0.055	0.177	0.006	0.134	-0.135
	42.878	11.750	7.972	4.551	4.131	3.745	3.169	2.164	1.451	1.371	1.333	1.241

	COMMUNALITIES	1	2	3	4	5	6	7	8	9	10	11
1	0.780	[illegible]	[illegible]	0.213	0.129	0.186	0.105	-0.013	-0.067	-0.040	0.055	[illegible]
2	0.734	[illegible]	[illegible]	[illegible]	0.145	0.212	0.095	0.121	-0.025	0.026	[illegible]	[illegible]
3	0.730	[illegible]	0.550	0.397	0.255	0.176	0.017	0.049	-0.085	0.002	0.027	[illegible]
4	0.770	0.515	0.497	0.397	0.096	0.312	0.064	0.046	-0.035	0.037	0.025	[illegible]
5	0.757	[illegible]	0.553	0.376	0.100	0.218	0.079	0.020	0.153	-0.113	[illegible]	[illegible]
6	[illegible]	[illegible]	0.772	0.216	0.098	0.198	0.163	0.076	0.092	-0.032	0.166	[illegible]
7	0.756	[illegible]	0.721	0.059	0.067	0.137	0.161	0.041	0.144	0.180	0.149	-0.157
8	0.754	[illegible]	0.709	0.171	0.119	0.115	0.053	0.192	0.092	0.049	-0.027	[illegible]
9	0.785	[illegible]	0.733	0.200	0.093	0.173	0.026	0.197	-0.023	-0.041	-0.105	[illegible]
10	0.752	[illegible]	0.643	0.178	0.043	0.266	0.063	0.237	[illegible]	0.013	-0.073	[illegible]
11	0.705	[illegible]	0.657	0.150	0.117	0.261	0.182	0.125	[illegible]	0.102	-0.160	[illegible]
12	0.725	[illegible]	0.655	0.146	0.009	0.231	0.106	[illegible]	0.218	0.231	0.238	[illegible]
13	0.710	0.107	[illegible]	[illegible]	0.277	0.343	0.019	0.125	0.160	0.131	0.035	[illegible]
14	0.678	[illegible]	[illegible]	0.313	0.683	0.562	0.036	0.228	0.113	-0.021	0.072	[illegible]
15	0.629	[illegible]	[illegible]	0.201	0.136	0.311	0.091	0.246	0.249	-0.000	0.041	[illegible]
16	0.707	[illegible]	0.357	0.267	0.135	0.496	-0.032	0.043	-0.085	-0.075	[illegible]	[illegible]
17	0.856	[illegible]	0.257	0.161	0.117	0.799	0.195	-0.024	0.051	0.102	0.151	[illegible]
18	0.852	[illegible]	0.232	0.067	0.105	0.834	0.154	0.100	0.067	0.078	-0.079	[illegible]
19	[illegible]	[illegible]	[illegible]	0.192	0.070	0.759	0.366	0.065	-0.033	0.093	0.045	[illegible]
20	[illegible]	[illegible]	0.126	0.277	0.140	0.282	0.659	0.057	-0.009	0.120	0.040	[illegible]
21	0.795	[illegible]	0.129	0.127	0.304	0.276	0.728	0.119	-0.001	0.063	0.064	[illegible]
22	0.733	[illegible]	0.095	0.273	0.095	0.215	0.651	0.577	0.064	[illegible]	0.129	[illegible]
23	0.755	[illegible]	0.169	0.096	0.140	0.133	0.626	0.724	0.068	0.122	0.094	[illegible]
24	0.747	[illegible]	0.746	0.273	0.192	0.073	0.678	0.145	0.260	-0.052	-0.121	[illegible]
25	0.746	[illegible]	[illegible]	0.256	0.124	0.093	0.160	0.532	0.212	0.037	0.031	[illegible]
26	0.760	[illegible]	0.340	0.142	0.149	0.155	0.651	0.627	0.613	0.509	0.053	[illegible]
27	0.800	[illegible]	0.315	0.150	0.179	0.163	0.561	0.174	0.393	[illegible]	0.045	[illegible]
28	0.758	[illegible]	0.303	0.215	0.112	0.096	0.156	0.153	0.219	0.063	-0.005	[illegible]
29	0.695	[illegible]	0.198	0.271	0.170	0.001	0.087	0.573	-0.439	0.069	0.215	[illegible]
30	0.763	[illegible]	0.460	0.237	0.137	-0.063	0.315	0.096	0.016	0.066	[illegible]	[illegible]
31	0.745	[illegible]	0.515	0.229	0.164	0.148	0.268	-0.026	0.005	0.212	-0.158	[illegible]
32	0.746	[illegible]	0.419	0.238	0.124	0.149	0.132	0.045	-0.027	0.045	-0.025	[illegible]
33	0.768	0.730	0.299	0.163	0.053	0.300	0.074	0.059	0.166	0.195	-0.061	[illegible]
34	0.817	0.717	0.338	0.298	0.150	0.196	0.119	0.107	0.010	0.099	-0.059	[illegible]
35	0.749	[illegible]	0.387	0.570	0.070	0.176	0.093	0.135	-0.409	0.019	-0.164	[illegible]
36	0.870	[illegible]	0.358	0.526	0.109	0.067	0.163	0.261	0.531	-0.113	[illegible]	[illegible]
37	0.799	[illegible]	0.345	[illegible]	0.051	0.083	0.164	0.216	0.441	-0.077	-0.091	-0.067
38	0.763	[illegible]	0.322	[illegible]	0.145	0.081	0.693	0.339	-0.037	[illegible]	0.136	[illegible]
39	0.817	0.730	0.295	0.140	0.206	0.064	0.144	0.233	0.105	0.167	0.025	[illegible]
40	0.786	[illegible]	0.316	0.148	0.163	0.070	0.170	0.149	0.139	0.169	0.037	[illegible]
41	0.893	[illegible]	0.077	0.140	0.130	0.129	[illegible]	0.154	0.076	-0.125	[illegible]	[illegible]
42	0.865	[illegible]	[illegible]	0.090	0.003	0.065	0.165	0.130	0.074	0.153	0.123	[illegible]
43	0.843	-0.037	-0.020	0.058	0.110	0.150	-0.065	-0.003	-0.021	0.029	0.064	[illegible]
44	0.738	[illegible]	0.277	0.559	[illegible]	0.033	-0.068	-0.012	0.019	0.011	0.153	[illegible]
45	0.771	[illegible]	0.478	0.377	0.360	0.057	0.135	-0.053	0.074	-0.007	0.162	[illegible]
46	0.780	[illegible]	[illegible]	0.565	0.316	0.058	0.265	0.034	0.151	[illegible]	0.069	[illegible]
47	0.749	[illegible]	0.135	0.730	0.223	0.198	0.115	0.169	0.039	0.175	0.057	[illegible]
48	0.667	[illegible]	0.298	0.589	0.172	0.238	0.078	0.146	-0.032	0.044	0.104	[illegible]
49	0.754	[illegible]	0.051	0.470	0.667	0.036	0.061	0.253	-0.113	0.137	0.059	[illegible]
50	0.748	[illegible]	0.056	0.219	0.765	0.111	0.061	0.032	0.146	[illegible]	0.174	[illegible]
51	[illegible]	[illegible]	0.675	[illegible]	0.564	0.071	0.039	0.143	-0.071	0.141	0.263	[illegible]
52	0.739	[illegible]	0.083	0.395	0.656	0.135	0.059	0.011	0.104	0.142	0.023	[illegible]
53	0.735	[illegible]	0.092	0.235	0.737	0.077	0.161	0.215	-0.050	0.102	0.062	[illegible]
54	0.785	[illegible]	0.307	0.500	0.417	0.127	0.190	-0.029	-0.036	0.123	-0.010	[illegible]
55	0.751	[illegible]	[illegible]	[illegible]	0.402	0.174	[illegible]	0.143	0.125	0.010	0.102	[illegible]
56	0.588	[illegible]	[illegible]	0.332	0.460	0.164	0.181	0.120	0.193	0.053	-0.160	[illegible]
57	[illegible]	[illegible]	0.213	[illegible]	0.542	0.346	-0.015	0.035	0.239	0.190	-0.117	[illegible]
58	0.698	[illegible]	0.297	0.331	0.279	0.338	0.167	0.063	0.031	0.154	-0.065	[illegible]
59	0.767	[illegible]	0.143	0.517	0.316	0.204	0.106	0.119	0.202	0.239	-0.071	[illegible]
60	0.690	[illegible]	[illegible]	[illegible]	0.740	0.025	0.167	0.012	0.024	-0.031	-0.155	[illegible]
	-5.10[illegible]	[illegible]	[illegible]	6.760	[illegible]	[illegible]	[illegible]	2.608	[illegible]	1.634	1.336	[illegible]

	COMMUNALITIES	1	2	3	4	5	6	7	8	9	10	11
1	0.748	[illegible]	0.107	0.180	0.210	0.483	0.141	0.056	0.118	-0.003	0.095	0.100
2	0.787	[illegible]	0.222	0.065	0.187	0.225	0.198	0.051	0.226	0.102	-0.079	[illegible]
3	0.754	0.611	0.327	0.216	0.193	0.345	0.075	0.095	0.193	0.015	0.016	[illegible]
4	0.900	[illegible]	0.259	0.264	0.152	0.460	0.094	0.124	0.041	0.004	-0.039	[illegible]
5	0.722	[illegible]	0.323	0.134	0.677	0.377	0.132	0.093	-0.093	0.112	0.093	[illegible]
6	0.765	[illegible]	0.116	0.268	0.240	0.484	0.162	-0.046	-0.034	-0.027	0.137	[illegible]
7	0.726	[illegible]	0.459	0.315	0.199	0.363	0.149	-0.192	0.021	0.046	0.216	[illegible]
8	0.754	[illegible]	0.142	0.228	0.129	0.419	0.114	0.039	0.051	0.152	0.212	[illegible]
9	0.779	[illegible]	0.236	0.349	0.117	0.457	0.061	0.152	-0.010	0.028	0.089	[illegible]
10	0.780	[illegible]	0.241	0.356	0.122	0.467	0.072	0.111	0.001	0.042	0.057	[illegible]
11	0.744	[illegible]	0.262	0.371	0.667	0.524	0.128	0.102	-0.092	-0.167	0.037	[illegible]
12	0.611	0.411	-0.003	0.312	0.192	0.304	-0.167	-0.148	0.351	0.096	0.173	[illegible]
13	0.722	[illegible]	0.461	0.299	0.248	0.145	0.027	0.122	0.306	0.140	-0.169	[illegible]
14	0.703	[illegible]	0.212	0.340	0.249	0.301	0.121	0.295	0.382	0.333	-0.185	[illegible]
15	0.745	[illegible]	0.166	0.650	0.268	0.460	0.208	0.251	0.056	0.226	-0.095	[illegible]
16	0.708	[illegible]	0.127	0.335	0.151	0.258	0.071	0.021	0.153	0.307	-0.083	[illegible]
17	0.948	[illegible]	0.124	0.318	0.087	0.074	0.065	0.036	0.059	0.115	0.030	[illegible]
18	0.877	0.176	0.089	0.890	0.699	0.104	0.062	0.083	0.047	0.076	0.039	[illegible]
19	0.794	[illegible]	0.196	0.754	0.154	0.208	0.096	0.093	0.030	-0.075	-0.013	[illegible]
20	0.722	[illegible]	0.261	0.196	0.588	0.029	0.182	0.124	0.101	-0.043	-0.099	[illegible]
21	0.772	[illegible]	0.200	0.103	0.780	0.192	0.033	0.124	0.007	-0.111	0.105	[illegible]
22	0.734	[illegible]	0.167	0.265	0.408	-0.029	0.023	0.474	0.055	-0.008	-0.107	[illegible]
23	0.781	[illegible]	0.058	0.057	0.106	0.094	0.027	0.322	-0.009	0.102	0.064	[illegible]
24	0.784	0.735	0.112	0.131	0.227	0.144	0.054	0.039	-0.010	0.131	0.303	[illegible]
25	0.692	[illegible]	0.153	0.110	0.316	-0.007	0.018	0.330	0.302	0.662	0.493	[illegible]
26	0.744	0.515	0.104	0.009	0.251	0.162	0.123	0.063	0.125	0.513	0.540	0.174
27	0.767	[illegible]	0.154	0.126	0.672	0.161	0.095	0.075	0.077	0.540	0.315	[illegible]
28	0.772	0.791	0.230	0.146	0.189	0.169	0.000	0.059	-0.049	-0.041	0.086	[illegible]
29	0.705	[illegible]	0.156	0.226	0.071	0.058	-0.054	0.422	-0.032	0.047	-0.047	[illegible]
30	0.777	0.516	0.185	0.309	0.219	0.065	0.189	0.257	-0.203	0.215	0.352	[illegible]
31	0.713	[illegible]	0.252	0.503	0.019	-0.002	0.306	0.023	-0.280	0.029	0.152	0.117
32	0.808	[illegible]	0.121	0.245	0.171	0.061	0.198	0.053	-0.024	0.104	[illegible]	[illegible]
33	0.769	0.761	0.108	0.105	0.121	0.052	0.387	0.097	-0.072	0.043	0.071	[illegible]
34	0.822	[illegible]	0.158	0.118	0.162	-0.024	0.143	0.022	0.099	0.047	0.124	[illegible]
35	0.778	[illegible]	0.327	0.255	0.197	0.159	0.625	0.205	0.070	0.060	-0.073	[illegible]
36	0.831	[illegible]	0.391	0.276	0.198	0.177	0.428	0.127	0.023	0.058	-0.111	[illegible]
37	0.841	[illegible]	0.382	0.256	0.124	0.164	0.556	0.114	0.055	0.071	-0.135	-0.011
38	0.755	[illegible]	0.143	0.144	0.069	0.065	-0.030	0.211	0.249	-0.168	0.157	[illegible]
39	0.819	[illegible]	0.153	0.196	0.655	0.059	0.065	0.239	0.175	-0.116	0.162	[illegible]
40	0.744	[illegible]	0.139	0.238	0.088	0.124	0.063	0.190	0.103	-0.016	0.045	[illegible]
41	0.643	[illegible]	0.262	0.039	0.230	0.131	0.068	-0.127	-0.197	0.203	0.052	0.114
42	0.915	[illegible]	0.011	0.041	0.016	0.054	0.022	-0.004	0.025	0.058	0.065	[illegible]
43	0.839	0.111	-0.025	0.056	-0.080	0.005	0.019	0.039	-0.016	0.142	0.050	[illegible]
44	0.820	[illegible]	0.618	0.147	0.309	0.025	-0.080	-0.028	0.045	0.101	-0.063	[illegible]
45	0.611	[illegible]	0.553	0.116	0.305	0.116	-0.027	-0.031	0.070	0.079	-0.032	[illegible]
46	0.944	[illegible]	0.690	0.076	0.231	0.010	0.018	-0.030	0.091	0.088	-0.116	[illegible]
47	0.746	[illegible]	0.597	0.103	0.151	0.000	0.011	-0.021	0.243	0.198	-0.034	0.101
48	0.742	[illegible]	0.409	0.148	-0.001	0.104	0.133	0.132	0.094	0.187	0.061	[illegible]
49	0.603	[illegible]	0.827	-0.013	0.012	0.065	0.011	0.172	0.096	-0.068	0.200	[illegible]
50	0.714	[illegible]	0.683	0.109	0.045	0.167	0.250	0.125	0.164	-0.165	0.173	[illegible]
51	0.768	[illegible]	0.898	-0.002	0.046	-0.035	0.087	0.072	0.555	-0.137	0.100	[illegible]
52	0.719	[illegible]	[illegible]	0.186	-0.047	-0.023	0.424	-0.191	0.537	0.257	-0.016	[illegible]
53	0.731	[illegible]	0.608	0.129	0.097	0.177	0.000	-0.002	0.026	-0.030	-0.032	[illegible]
54	0.630	[illegible]	0.659	0.243	0.278	0.151	0.054	-0.071	0.021	0.038	-0.079	[illegible]
55	0.816	[illegible]	0.508	0.225	0.476	0.039	0.259	0.022	0.025	-0.026	-0.193	[illegible]
56	0.700	[illegible]	0.275	0.109	0.203	0.144	0.161	0.039	0.077	0.031	0.037	[illegible]
57	0.664	[illegible]	0.459	0.296	0.146	0.144	0.122	0.028	0.055	-0.057	0.095	[illegible]
58	0.706	[illegible]	0.340	0.249	0.168	0.274	0.156	0.057	0.202	-0.073	0.081	[illegible]
59	0.795	[illegible]	0.610	0.141	0.359	0.030	0.183	0.077	-0.084	-0.033	-0.069	[illegible]
60	0.735	[illegible]	0.796	0.073	-0.015	0.024	0.230	0.048	-0.004	0.079	0.055	[illegible]
	45.992	10.835	7.794	4.893	3.693	3.049	2.062	2.034	1.745	1.655	1.316	1.301

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